2004

Annual Report on Traumatic Work-Related Fatalities in Michigan

2004 Annual Report
On Traumatic Work-Related Fatalities in Michigan

A Joint Report
Of the
Michigan State University
Department of Medicine
117 West Fee Hall
East Lansing, Michigan 48824-1315
(517) 353-1846

Kenneth D. Rosenman, MD
Professor of Medicine
Debra A. Chester, MS
Industrial Hygienist

And

Wayne State University
Eugene Applebaum College
of Pharmacy and Health Sciences
Department of Fundamental and Applied Sciences
259 Mack Ave-Room 5138
Detroit, Michigan 48201
(313) 993-4233

Patricia A. Brogan, PhD, CIH

And

Michigan Department of Labor and Economic Growth
MIOSHA
P.O. Box 30649
Lansing, Michigan 48909-8149
(517) 322-1851

John Peck
Director, Management and Technical Services Division

December 20, 2005

Table of Contents

Summary

This is the 4th annual report on traumatic work-related fatalities in Michigan. One hundred thirty one individuals died in 2004 from an acute traumatic injury at work, down from 152 in 2003, 151 in 2002 and 174 in 2001. There have been no changes in the system to track these deaths. Possible causes for the decrease could include increased unemployment, safer working conditions or statistical variation. To determine whether this decrease in the number of deaths reflects a true downward trend or a fluctuation of small numbers can only be ascertained by further years of surveillance.

The 131 individuals who died had 127 different employers; four employers had a fatal incident where more than one person died. A description of each work-related death is in Appendix I. Copies of the Michigan Fatality Assessment and Control Evaluation (MIFACE) reports of on-site investigations are at the Michigan State University Department of Occupational and Environmental Medicine (MSU OEM) website: www.oem.msu.edu/.

Industries were classified using the North American Industry Classification System[1] (NAICS). There were 32 deaths in Construction (NAICS 23), 19 deaths in Manufacturing (NAICS 31-33), 17 deaths in Transportation and Warehousing (NAICS 48-49), and 15 deaths in Agriculture, Forestry, Fishing and Hunting (NAICS 11). The largest change in deaths occurred in the Agricultural sector where deaths were down from 32 in 2003.

The ranking of industries by *risk* of death differed from the ranking of industries by the largest number of deaths. Mining had the highest annual average incidence rate (31.3 deaths per 100,000 workers), followed by Agriculture (18.8 deaths per 100,000 workers), Construction (16.8 deaths per 100,000 workers), and then Transportation and Warehousing (16.4 deaths per 100,000 workers).

The most common means of death were motor vehicles (29, 22.1%), followed closely by machine-related (26, 19.8%) and homicides (22, 16.8%). Sixteen (12.2%) individuals died after falling from a height and 13 (9.9%) after being struck by an object.

Most deaths occurred among men (91.6%). The average age of death was 44.3 years and ranged from 6 to 88. Seventy-nine percent of the deaths were Caucasians. Fatal injuries occurred in 44 of Michigan's 83 counties, with Wayne County having the largest number, 34.

For 24 of the non-suicide deaths, illegal drugs, alcohol or prescribed medications may have contributed to the individual's death; illegal drugs in 10, alcohol in 8, prescribed medication in 4, illegal drug and prescribed medication in 1, and alcohol and prescribed medication in 1 death.

The largest number of fatal work-related traumatic events occurred on Tuesdays and Thursdays (25 each, 19.2%) followed by Friday (21, 16.2%), then Wednesday (20, 15.4%) and Monday (19, 14.6%). October was the most common month (20, 15.3%) and 12:00 p.m. - 3:59 p.m. was the most common time of the day (38, 30.9%) for the occurrence of traumatic incidents.

Michigan Occupational Safety and Health Administration (MIOSHA) staff investigated 44 of the deaths at 43 employers. The police investigated 56 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 53 different employers. Nine of the deaths (nine different employers) were investigated by Federal agencies (National Transportation Safety Board, Mine Safety and Health Administration, Federal Railroad Administration, and Occupational Safety and Health Administration). The remaining 22 work-related fatalities (22 employers) were not investigated by any regulatory agency as to cause of death other than by the police to exclude a homicide or suicide.

Although acute work-related traumatic fatalities represent only a small percentage of the approximately 87,000 deaths that occur annually in Michigan, work-related traumatic fatalities are preventable. The descriptions of the acute traumatic work-related deaths in Appendix I highlight these tragedies and the need to take action to prevent them despite their relatively small number. Further efforts to investigate the circumstances leading to these deaths and disseminate information from what we learn are necessary to educate and, where applicable, recommend change in regulations to prevent similar deaths from occurring in the future. We are very pleased to see the decrease in deaths in 2004 and plan to further investigate the cause for this decrease in hope of identifying factors that can further reduce the number of deaths in the future.

Background

The Michigan Fatality Assessment and Control Evaluation (MIFACE) is a joint research project of Michigan State University College of Human Medicine's Occupational and Environmental Medicine Division, Wayne State University Department of Fundamental and Applied Sciences, and the Michigan Department of Labor and Economic Growth. Surveillance and prevention activities of traumatic work-related deaths by MIFACE began January 1, 2001.

The purpose of the MIFACE surveillance project is threefold: 1) identify types of industries and work situations where workers are dying from acute traumatic incidents, 2) identify the underlying causes of the work-related fatality, and 3) formulate and disseminate prevention strategies to reduce work-related fatalities.

MIFACE uses the National Institute for Occupational Safety and Health (NIOSH) Fatality Assessment and Control Evaluation (FACE) program as a model. Since 1982, NIOSH has funded a multi-state FACE program. The goal of the FACE program is to "prevent occupational fatalities across the nation by identifying and investigating work situations at high risk for injury and then formulating and disseminating prevention strategies to those who can intervene in the workplace." NIOSH FACE investigations have provided aggregate data to identify high-risk industries and work practices as well as provided the stories or "faces" necessary to make the statistics real and influence change in the workplace. Emphasis on information dissemination and translation of information into user-friendly materials is an important part of both the NIOSH and MIFACE program.

Methods

MIFACE uses numerous sources to identify persons who have died from a work-related injury: (1) MIOSHA, (2) Police Departments, including Fatality Analysis Reporting System (FARS) crash reports, (3) County Clerks, (4) Medical Examiners, (5) Michigan State University County Extension Offices, (6) Newspaper articles, and (7) Emergency Service Providers, including Fire Departments.

Any person who dies from a work-related injury that occurs while performing his/her job is included in the MIFACE program. Deaths from natural causes, such as heart attacks that occur at work, are not included. Suicides are included, following the protocol established by the NIOSH FACE program as well as that of the United States Department of Labor, Bureau of Labor Statistics (BLS), which collects the official statistics of work-related deaths in all states.

Once an individual has been identified and confirmed as an eligible work-related death, various sources of information are used to describe the circumstances associated with the fatal event. Basic information collected includes: the size of the company; the content of the safety program; the victim's age, gender, and occupation; tasks the victim was performing; tools or equipment the victim was using; the working environment; the energy exchange resulting in the fatality; and the role of management in controlling how these factors interact.

The level of information collected for each fatality depends on the type of incident.

For homicides, suicides and most transportation-related fatalities that occur while the individual is at work, MIFACE collects source documents and does not attempt to perform an on-site investigation.

Source documents include reports from agencies that investigate the death or provide emergency services when the event occurs, death certificates, medical examiner reports and, when appropriate, the MIOSHA fatality investigation narrative. Information about work-related fatalities that involve motor vehicles is obtained from the State of Michigan Traffic Crash Report (UD-10) that is completed by the police agency that responds to the incident.

For the remaining work-related fatalities, including agricultural fatalities, MIFACE initiates contact with employers or farm family members to request permission for an on-site investigation. Employer participation in the MIFACE program is voluntary and is unrelated to any regulatory or enforcement procedures. It is important to note that MIFACE investigators do not enforce compliance with Michigan Occupational Safety and Health Administration (MIOSHA) rules and regulations and do not assign fault or blame. However, to decrease the burden to the employer of multiple investigations, MIFACE with employer agreement, accompanies the MIOSHA compliance officer. MIFACE also interviews the compliance officers about their investigations.

When the MIFACE on-site fatality investigation is completed, a report is written based on the facts identified during the investigation and from reviewing the source documents. Neither reports nor educational materials produced by the MIFACE program contain personal identifiers. The MIFACE report contains a summary of the fatal incident, a detailed narrative of the fatal incident, the cause of death and recommendations to minimize the chances of a similar fatality occurring in the future. Before releasing the MIFACE report, the report is reviewed by members of the MIFACE advisory board and MIOSHA (if MIOSHA conducts an investigation).

The MIFACE report is sent to the employer, business trade organizations, labor unions and trade journals and other groups that could potentially affect work practice changes to eliminate or reduce the chances of a fatality occurring under similar circumstances in the future. The reports are also posted on the MSU OEM website at www.oem.msu.edu/. Also posted on the website are summaries of MIOSHA investigated cases and Hazard Alerts summarizing individual work-related cases as well as Hazard Alerts for specific targeted industrial sectors.

The 2000 Standard Occupational Classification (SOC) system is used to categorize occupations of the individuals who died. The 2000 SOC is divided into 23 major groups, which are sometimes called “job families. ” The “job families” group individuals according to the nature of the work performed, placing all people who work together into the same group regardless of their skill level. The 23 “job families” are further subdivided using a six-digit structure for its 821 detailed occupations within those groups.

The North American Industry Classification System (NAICS) has 20 sectors that group establishments into industries according to primary economic activity. NAICS uses a six-digit coding system to identify particular industries and how those industries are placed within the

NAICS coding structure. MIFACE classifies an establishment to an industry when the establishment's primary activity meets the definition for that industry.

Results

There were 131 acute traumatic work-related fatalities in 2004. One hundred thirty (99.2%) of the 131 work-related traumatic incidents occurred in 2004. One individual fell from a height in 2003 and died of complications from their injuries in 2004.

Demographics

The demographic characteristics of all workers fatally injured on the job are shown in Table 1.

Gender

One hundred twenty (91.6%) of the individuals who died were men and 11 (8.4%) were women.

Race/Ethnicity

One hundred four (79.4%) individuals who died were Caucasian, 18 (13.7%) were African-American, 4 (3.1%) were Hispanic, 4 (3.1%) were Asian-Pacific, and one (0.8%) was American Indian. Seven of the 11 women were Caucasian and four women were African-American. Ninety-seven (80.8%) men were Caucasian, 14 (11.7%) were African-American, 4 (3.3%) were Hispanic, 4 (3.3%) were Asian-Pacific, and one (0.8%) was American Indian. One individual, classified as Caucasian for this report, was identified on his death certificate as Caucasian, with Hispanic ethnicity.

Age

The age distribution of the individuals who died from a work-related injury is shown in Table 1 and Figure 1 and by industry in Table 2. The ages ranged from 6 to 88, with one death in a youth (age 6) and 10 deaths in individuals 70+ years old. The average age was 44.3 years, down from 45.8 years in 2003, and up from 42.2 years in 2002. One hundred twenty (91.6%) deaths occurred in individuals between the ages of 18-69.

The 6-year-old youth who died worked on a farm and was struck and run over by a skid-steer loader driven by his 9-year-old brother.

Five of the ten individuals with ages ranging from seventy to eighty-eight who died from acute work-related events were farm owner/operators. Two individuals were employed in Construction (NAICS 23), one individual was a minister (NAICS 81), one individual was a security officer for a casino (NAICS 71), and one individual was a truck driver employed by a manufacturing company (NAICS 31-33).

The majority of deaths in Construction (NAICS 23) occurred between the ages of 20-49 (24, 75.0%); ages 20-29 had 10 (31.3%) deaths and ages 40-49 had 11 (34.4%) deaths. In

Manufacturing (NAICS 31-33), with the exception under 20 years of age and over 70 years of age, each age group had at least three deaths. In Transportation and Warehousing (NAICS 48-49), over one-half of the deaths occurred between the ages of 30-59 (12, 70.6%). The majority of deaths in Agriculture (NAICS 11) occurred between the ages of 60-89 (10, 66.7%).

Marital Status

Seventy-six (58.5%) individuals who died from traumatic incidents were married, 30 (23.1%) were single or never married, 20 (15.4%) were divorced, and 4 (3.1%) were widowed. Marital status was unknown for one individual.

Educational Level

Table 1 shows the distribution of educational level and Table 3 shows the distribution of educational level by industry. Overall, 23 individuals (18.1%) had not completed high school, 67 (52.8%) completed high school and received a high school diploma, 31 (24.4%) completed one to four years of college, and 6 (4.7%) had over five years of college. Educational level was unknown for four individuals.

Within industries having 15 or more deaths, the most common education level among individuals who died was completing high school but no college. Construction, Manufacturing, and Agriculture had 50% or more of the deaths occur among this educational level (18 deaths, 58.1%; 10 deaths, 52.6%; and 7 deaths, 50.0% respectively). Manufacturing had the highest percentage of death among individuals with some college education (6 individuals, 31.6%), followed by Transportation and Warehousing (4, 26.7%). Although Construction had the same number of people as Manufacturing with some college education die (6, 19.4%), two of the six individuals had attended college at a post-graduate level. Among individuals who did not complete high school, the highest proportion of deaths occurred while working in Agriculture (6, 42.9%), Transportation and Warehousing (5, 33.3%), and Construction (7, 22.6%). One of the six individuals in Agriculture was a youth.

Drug/Alcohol/Medication Use

Ninety-eight of the 127 non-suicide cases (77.2%) are known to have had an alcohol screen performed after death. Eight individuals (9.2%) had measurable blood alcohol levels; the levels were 0.01%, 0.02%, 0.03%, 0.09%, 0.11%, 0.169%, 0.18%, and 0.367%. One individual had measurable alcohol in his urine. One of the eight individuals with measurable alcohol (0.01%) was a passenger in a motor vehicle crash who was not wearing his seatbelt and was ejected from the vehicle.

Ninety-five of the 127 non-suicide cases (74.8%) had a drug screen performed after death. Eleven individuals (11.6%) tested positive for illegal drugs; three individuals tested positive for both marijuana and a marijuana metabolite, three individuals tested positive for a cocaine metabolite, two individuals tested positive for both cocaine and a cocaine metabolite, one individual tested positive marijuana, one individual tested positive for a marijuana metabolite in

their urine, and one individual tested positive for cocaine and a marijuana metabolite in their urine.

Among the non-suicide cases, 32 (25.2%) individuals tested positive for metabolites of medication (prescription and over-the-counter). After reviewing the type of medications found, we concluded that in six deaths, medications might have been a factor in the death. The medications in five of the deaths were: amphetamine, hydrocodone (two individuals), oxycodone, and bupropion. The sixth individual died from intoxication of a prescription drug that had been abused or obtained illegally. None of the over-the-counter medication metabolites found were thought to have contributed to the death: salicylate (two individuals), pseudoephedrine (two individuals), diphenylhyramine, acetaminophen, niacin, phenethylamine, naproxen, and chlorpheniramine.

Among the non-suicide deaths, a total of 24 individuals had measurable levels of alcohol, illegal drugs or medications in their system at the time of their death, which may have been a risk factor for the occurrence of the injury. One of the 24 individuals had an overlap of a prescription drug and illegal drug in their body fluid at the time of his death, and one individual had an overlap of a prescription drug and alcohol in his body fluid.

Work-Related Event Details

Day of Injury

Table 4 shows the day of injury by industry. Overall, the largest number of work-related fatal injuries occurred on a Tuesday or Thursday (25 each, 19.2%). Friday had the next highest number of work-related fatal injuries (21, 16.2%). Wednesday had 20 (15.4%) fatal injuries, Monday had 19 (14.6%), Saturday had 12 (9.2%) and Sunday had 8 (6.2%) fatal injuries. The day of injury was unknown for one individual.

In the Construction industry, Thursday had the highest number of work-related injuries (9, 28.1%), followed by Tuesday, Wednesday and Friday (5 each, 15.6%). In Manufacturing, Wednesday was the weekday where most fatal injuries occurred (5, 26.3%), followed by Tuesday, Thursday and Friday with three (15.8%) fatal injuries each. Most work-related fatal injuries in the Transportation and Warehousing industry occurred on Tuesday and Friday (4 each, 23.5%), followed by Wednesday and Thursday (3 each, 17.6%) In Agriculture, Monday, Tuesday and Friday were the days when the highest number of fatal injuries occurred (3 each, 20%).

Friday was the day of the week when the most work-related homicides occurred (5, 22.7%), followed by Sunday and Wednesday (4 each, 18.2%).

Month of Injury

Table 5 shows the month of injury by industry. October had the highest number of injuries resulting in fatalities with 20 (15.3%), followed by September with 18 (13.7%), June with 17 (13.0%), then May with 12 (9.2%) fatal injures and March with 11 (8.4%) fatal injuries. Of the

32 deaths in the Construction industry, October had twice as many incidents (8, 25%) than the rest of the year. September had four injuries (12.5%), and then May, June, July and November (3 each, 9.4%). Most Manufacturing work-related fatal injuries occurred in the fall season of October, November, and December (3 each, 15.8%). July was the most likely month for a fatal injury (3, 17.6%) in the Transportation and Warehousing industry. In the Agricultural industry, June was the most likely month for a fatal injury (4, 26.7%), followed by September and October (3 each, 20.0%).

Table 6 shows the means of death by the month the injury occurred. Motor vehicle fatalities occurred most often in July (5, 17.2%), followed by September and November (4 each, 13.8%). Machine-related fatal injuries occurred most often in the months of June and September (5 each, 19.2%) and October (4, 15.4%). Most homicides occurred (5 each, 22.7%) in September and October.

Time of Injury

The time of the injury could be placed within a four-hour time period in 123 of the 131 (93.9%) work-related deaths. The 24-hour day was divided into the four-hour time periods: 12:00 a.m. - 3:59 a.m., 4:00 a.m. - 7:59 a.m., 8:00 a.m. -11:59 p.m., 12:00 p.m. - 3:59 p.m., 4:00 p.m. - 7:59 p.m., and 8:00 p.m. - 11:59 p.m.

Table 7 shows the four-hour time periods by industry. Overall, 38 (30.9%) fatal injuries occurred between 12:00 p.m. - 3:59 p.m., 32 (26.0%) occurred between 8:00 a.m. - 11:59 a.m., 17 (13.8%) occurred between 8:00 p.m. - 11:59 p.m., 15 (12.2%) occurred between 4:00 p.m. - 7:59 p.m., 12 (9.8%) occurred between 12:00 a.m. - 3:59 a.m., and 9 (7.3%) fatal incidents occurred between 4:00 a.m. - 7:59 a.m.

Within Construction, 24 (77.4%) of the 31 work-related fatal injuries with a known time of injury occurred between the traditional daytime hours of 8:00 a.m. - 11:59 a.m. and 12:00 p.m. - 3:59 p.m.; each time period had 12 fatal injuries. Later afternoon between 12:00 p.m. - 3:59 p.m. was the time period most fatal injuries occurred in Manufacturing (7, 38.9%), Transportation and Warehousing (8, 47.1%) and Agriculture (4, 33.3%).

Most homicides (7, 38.9%) occurred in the early morning hours of 12:00 a.m. - 3:59 a.m., followed closely by 8:00 a.m. - 11:59 a.m. and 8:00 p.m. - 11:59 p.m. with six (28.6%) homicides occurring in each time period.

Place of Death

For 68 (51.9%) individuals, the place of death was at the scene of the traumatic incident. For 61 (46.6%) individuals, the death occurred in the hospital. One (0.8%) individual died at his home after he fell at work and one (0.8%) died in the ambulance.

Geographic Distribution

Table 8 and Figure 2 show the county in which the victim worked where he/she was fatally injured. Over one-half (44 of 83, 53.0%) of Michigan's counties had a traumatic fatal work-related injury occur. The most common locations were: Wayne (34 fatal injuries, 26.0%) and Macomb (12, 9.2%). Washtenaw County had 6 (4.6%) fatal injuries. Oakland and Kent counties had 5 fatal injuries each (3.8%). Mackinac and Eaton counties had 4 fatal injuries each (3.1%). Six counties had three fatal injuries, nine counties had two fatal injuries, and 21 counties had one fatal injury.

Type of Industry

Table 9 shows the number of work-related fatalities and Michigan's annual incidence rate by industry.

Mining (NAICS 21), although having only two work-related fatalities had the highest incident rate (31.3/100,000 workers) in Michigan in 2004. Agriculture (NAICS 11) was next with an incident rate of 18.8/100,000 workers. The incident rate for Construction (NAICS 23) was 16.8/100,000 workers followed closely by Transportation and Warehousing with an incident rate of 16.4/100,000 workers. Manufacturing (NAICS 31-33) had more deaths (19 deaths) than Transportation and Warehousing (17 deaths) and Agriculture (15 deaths), but due to the greater number of workers in the Manufacturing industry, the incidence rate was lower at 2.9/100,000 workers.

Within Construction, 24 of the 32 (75.0%) deaths occurred in the Special Trade Contractors classification. The Transportation industry (NAICS 48) had 15 of the 17 (88.2%) Transportation and Warehousing deaths. Over one-third of the deaths (6 of 15, 40.0%) in Transportation occurred in the Truck Transportation classification.

Manufacturing (NAICS 31-33) had 19 deaths in 2004 compared to 10 deaths in 2003. The highest number of deaths in Manufacturing occurred within the Transportation Equipment Manufacturing classification (6 deaths, 31.6%). More manufacturing industry classifications were represented in 2004; 10 classifications compared to 5 classifications in 2003. Four industry classifications were common to 2003 and 2004 and three of these classifications had a similar number of deaths. The industry classification in Manufacturing that differed the most in the number of deaths was Transportation Equipment Manufacturing; three deaths in 2003 and six deaths in 2004.

Agriculture had 15 deaths in 2004, a dramatic decrease from 32 deaths in 2003. Eleven of the 15 deaths (73.3%) occurred among individuals who were in Crop Production. The remaining four deaths occurred among individuals in Animal Production. In 2003, 22 deaths were attributable to machine-related events. The number of machine-related events decreased to 6 in 2004. Twenty of the 22 events in 2003 involved tractors: 11 tractor rollovers (4 to the rear, 7 to the side) and 5 events involved the tractor or its attached implement running over the individual. Two individuals died when the tractor pinned the individual against another object. One individual was entangled in an unguarded PTO shaft on the tractor, and one individual was killed when the

tractor seat he was sitting on broke and he fell backwards and struck his head on the plow. In 2004, five of the six machine-related events involved tractors; three individuals were run over by the tractor, one individual was killed when the tractor overturned to the side and one individual died when the tractor overturned to the rear.

In 2004, there was one Agricultural death in May, July and August, while there were 19 in those months in 2003.

Public Administration (NAICS 92) had eight (6.1%) deaths, twice the number of deaths from 2003. Seven of the eight (87.5%) deaths occurred in the Justice, Public Order and Safety Activities classification. Six of the seven individuals were either police officers or sheriffs; one individual was a corrections officer for a prison. In 2003, three of the four individuals were either police officers or sheriff. In 2003, a motor vehicle crash killed two of the three officers; in 2004, a motor vehicle crash killed three officers and the prison corrections officer. Three officers in 2004 and one officer in 2203 were killed as a result of a homicide.

Other Services (except Public Administration) (NAICS 81) had seven (5.3%) deaths. Repair and Maintenance activities comprised the majority of the deaths (four of seven, 57.1%)

Administrative and Support and Waste Management and Remediation Services (NAICS 56), Wholesale Trade (NAICS 42), Health Care and Social Assistance (NAICS 62) and Accommodation and Food Services (NAICS 72) each had five (3.8%) deaths. Four of five (80%) deaths in Accommodation and Food Services occurred in Food Service/Drinking Places.

Retail Trade (NAICS 44-45) had four (3.1%) deaths, one-third the number of deaths (12) in 2003. In 2003, there were eight deaths as a result of homicide, three deaths due to motor vehicle crashes, and one death due to a fall. All four individuals in 2004 died as a result of a homicide. In 2003, five individuals employed in Motor Vehicle and Parts Dealer activities died: three due to homicide and two due to motor vehicle crashes. In 2004, only one individual in the Motor Vehicle and Parts Dealer died.

Arts, Entertainment and Recreation (NAICS 71) had three (2.3%) deaths. Mining (NAICS 21) and Educational Services (NAICS 61) each had two (1.5%) deaths. Real Estate and Rental and Leasing (NAICS 53) and Professional, Scientific and Technical Services (NAICS 54) each had one (0.8%) death.

Table 10 shows the means of death by industry. Within Construction, 12 of the 32 (37.5%) construction-related deaths were as a result of a fall from a height. Seven (21.9%) individuals were killed as a result of a motor vehicle accident. Four (12.5%) individuals died as result of being struck by an object (steel roof truss, concrete masonry wall, hoist motor, excavation dirt wall), four (12.5%) died as a result of contact with electrical current, and four (12.5%) died in machine-related events. One (3.1%) individual died due to an elevated carbon monoxide level while working in a home being heated by propane.

In Manufacturing, machine-related events accounted for seven of the 19 (36.8%) of the deaths. Four (21.1%) individuals were killed in motor vehicle related events. Three (15.8%) individuals were struck by an object (machine, debris from failure of gearbox or motor, steel plate). Two

(10.5%) individuals died as a result of a fall from a height. One (0.8%)individual was killed as a result of an aircraft crash, one individual was killed by a coworker, and one individual committed suicide.

Surprisingly, only five of the 17 (29.4%) deaths in Transportation and Warehousing involved motor vehicles. Three individuals died as a result of being struck by an object (bar steel, hose under pressure, coil of steel cable), two (11.8%) individuals died in aircraft incidents, two (11.8%) individuals died in machine-related events (pinned between train cars, caught in grain auger), and two (11.8%) died as a result of a homicide at work. One (5.9%) died from being asphyxiated after entering a tanker, one (5.9%) individual died when he climbed up his tanker truck and contacted an electrical current, and one (5.9%) individual died when he fell from a train.

Machine-related events accounted for six of the 15 deaths (40.0%) in Agriculture. Five of the six fatal incidents involved tractors. Three of the five individuals were run over by the tractor they were operating. One individual was killed when his tractor rolled over to the rear, and one was killed when his tractor overturned to the side. One individual was run over by a skid-steer loader. Two individuals were struck by an object (piece of hardened lime, utility pole he was moving with his tractor). One individual died as a result of an electrocution, one individual died as a result of a fall, one individual died after being trampled by horses, one individual died from an asthma attack when cleaning a bulk milk tank, and one individual died when he was thrown from his tractor as a result of being struck from behind by a car as he was driving the tractor on a road. Two individuals committed suicide.

Table 11 compares the incident rate by industry in Michigan to national rates for 2004. Several industrial sectors have higher fatality rates when compared to US fatality rates. The incident rate for Construction industry (16.8/100,000) exceeds the national fatality rate for Construction (11.9/100,000) as does Mining (31.3/100,000 vs. 28.3/100,000), Other Services (3.9/100,000 vs. 3.0/100,000), and Government (3.2/100,000 vs. 2.5/100,000). Several Michigan industries had notably lower fatality rates compared to US fatality rates: Agriculture (18.8/100,000 vs. 30.1/100,000), Professional and Business Services (1.0/100,000 vs. 3.2/100,000) and Retail Trade (0.8/100,000 vs. 2.3/100,000)

Occupations

Table 12 and Figure 3 shows the distribution of occupational categories. The occupational category with the highest number of work-related deaths was Construction and Extraction Occupations (47-000) accounting for 28 of the 131 (21.4%) work-related deaths in Michigan in 2004. Within this major grouping, Construction Trades Workers (47-2000) and Helpers, Construction Trades (47-3000) accounted for 24 of the 28 (85.7%) work-related deaths. Five Roofers (47-2181) and two Roofer's Helpers (47-3016) accounted for seven of the 24 deaths (29.2%).

Transportation and Material Moving Occupations (53-0000) accounted for 24 (18.3%) deaths. Within this occupation category, Truck Drivers, Heavy and Tractor-Trailer (53-3032) accounted for 12 of the 24 (50.0%) deaths. Management occupations (11-0000) followed with 20 (15.3%) deaths in 2004. Fourteen Farmers and Ranchers (11-9012) died in 2004, accounting for 70.0% of

the deaths within this occupational category. Protective Services (33-0000) occupations had 11 (8.8%) deaths. Six Police and Sheriff's Patrol Officers (33-3051) died in 2004.

Victim's Activity at the Time of the Fatality

The activity of the victim at the time of the fatality was identified for the 105 non-homicides/non-suicide related deaths. In these 105 deaths, the individual was the operator in 63 fatal incidents (60.0%), a coworker directly involved in the work activity in 30 fatal incidents (28.6%), a passenger in a car, truck or plane in six fatal incidents (5.7%), or a bystander or pedestrian in three (2.9%) incidents. Two (1.5%) individuals died as a result of a drug overdose and one (0.8%) individual was a victim of a fire.

In 31 (23.7%) of the fatal incidents, the individual who died was working indoors. The individual was working outdoors in 100 (76.3%) incidents.

The victim was working alone in 75 fatal incidents (58.6%) and working with a coworker in 53 fatal incidents (41.4%). Whether the victim was working alone or with a coworker could not be identified in three fatal incidents. For the 22 homicide cases, 11 (55.0%) of the victims were working alone, and 9 (45.0%) were working with a coworker. Working alone or with a coworker could not be determined in two homicide cases.

Means of Work-Related Death

Table 10 summarizes the 131 work-related fatalities by means of death and number of fatal incidents (125). Motor vehicle events accounted for 29 (22.1%) of all work-related deaths in Michigan in 2004, followed by machine-related deaths (26, 19.8%), and falls (16, 12.2%). Twenty-two (16.8%) homicides and four (3.1%) suicides occurred at work.

An object striking an individual occurred in 13 (9.9%) incidents. Seven (5.4%) individuals were electrocuted, five (3.8%) died as a result of a toxic exposure, four (3.1%) died as a result of an aircraft crash, and three (2.3%) were killed as a result of a fire or explosion. One (0.8%) individual each died as a result of an animal-related injury and asphyxiation.

Aircraft

There were four individuals fatally injured in aircraft-related incidents. One home built, single-engine airplane carried three individuals and was in flight at the time of the incident. The other individual was piloting a helicopter that was attempting to land when the helicopter crashed.

Animal

One individual died when horses pulling a manure wagon trampled her.

Asphyxiation

One individual was asphyxiated when he entered a tanker truck to repair a valve or seal.

Electrocution

Seven individuals were electrocuted. Four of the seven deaths involved contact with energized overhead lines; one individual was electrocuted after a raised boom contacted a 7,600-volt line, one individual was in a trench helping to place a culvert when an excavator boom contacted a 7200-volt line, one individual was moving an aluminum hoist ladder when the hoist ladder contacted a 7200-volt power line, and one individual was on his semi-truck's water tank when he directly contacted a 14,400-volt overhead line. One individual contacted 240 volts while repairing a tower light system cable, one individual contacted an energized grain auger, and one individual contacted 105 volts while using a portable electric grinder.

The victim's work area was dry in one incident, wet in one incident, greasy in one incident, and dewy in one incident.

Explosions/Burns

Three individuals died as a result of fire or explosion. One individual was a caretaker for an elderly woman in her home. The caretaker lived in the basement and was sleeping when a fire occurred. One individual was cutting a strap around a gas tank with a cutting torch. One individual was cleaning a basement floor with a flammable solvent when the vapors migrated to a hot water heater's pilot light and flashed back to her.

Falls

Falls accounted for 16 of the work-related fatalities. The reason for the fall was identified for 14 (87.5%) individuals. The individual slipped or tripped in seven (50.0%) incidents. In two (14.3%) incidents, the structure the victim was using gave way. Two (14.3%) individuals fell from an aerial lift. One (7.1%) individual fell because the rope that was suspending him above the ground broke. One (7.1%) individual fell due to a medical condition, and one (7.1%) individual fell because a falling coworker struck him.

The distance the worker fell was identified in 13 of the 16 falls. In two (15.4%) incidents, the individual's fall was less than 10 feet. Five (38.5%) incidents had falls between 10-20 feet. Four (30.8%) individuals fell between 21- 50 feet. For two (15.4%) incidents, the fall was 50+ feet (90 feet, 190 feet).

The surface location from which the worker fell was identified for 15 of 16 falls. Individuals fell from a scaffold or ladder in four (26.7%) incidents, a vehicle, machine or other equipment in four (26.7%) incidents, and the ground surface in two (13.3%) incidents. A tower (communications and electrical) was the location from which the individual fell in two (13.3%) incidents, an unguarded roof opening in one incident, an unguarded roof edge in one incident, and while being suspended by a rope in one incident.

The surface to which the worker fell was identified for 15 falls. In nine (60.0%) incidents, the individual fell to a concrete, rock or asphalt surface. Two (13.3%) individuals fell to packed dirt.

Each of the following surfaces had one (6.7%) fall each: crushed stone, frozen ground, onto a machine, and railroad tracks.

The condition of the work surface the victim fell from was known in 12 of 16 falls. The victim fell from a dry working surface in 11 incidents. One individual fell from a working surface that was frost-/snow-covered.

Eight of the 16 (50.0%) falls occurred while individuals were working on construction activities. Five falls occurred during commercial construction activities and three during residential construction activities (including two falls that occurred at the same time during the repair of a barn roof). Three (18.8%) falls occurred at manufacturing facilities. Two (12.5%) falls occurred while working on towers. One (6.3%) fall occurred on a railroad, one (6.3%) fall occurred on a farm, and one (6.3%) fall occurred from a vehicle.

Homicides

There were 22 work-related homicides, 7 more than in 2003. Twenty (90.9%) homicide victims were men and two (9.1%) victims were women.

Four (18.2%) individuals worked in Retail Trade. Four (18.2%) individuals worked in Other Services (automotive oil change and lubrication facility, a nail salon, a dry cleaner/laundry facility and a religious organization), three (13.6%) individuals worked in Accommodation and Food Service, and three (13.6%) worked in Public Administration. The Transportation and Warehousing, Educational Services and Health Care and Social Assistance each had two (9.1%) homicide victims. One (4.5%) individual each died as a result of a homicide in Administrative and Support and Waste Management and Remediation Services and Manufacturing.

Nine (40.9%) work-related homicide victims were Caucasian, nine (40.9%) were African-American, three (13.6%) were Asian-Pacific and one (4.5%) was Hispanic. Nine of the 18 (50.0%) work-related fatalities among African-Americans were homicides. Two of the ten (20.0%) work-related fatalities among women were homicides.

A gun was the cause of death in 19 (86.4%) homicides. One individual died as a result of being beaten and left in his place of business while it was burned, one individual died as a result of a fatal knife injury and for one individual, a sword was the cause of his death.

Machine-Related Deaths

There were 26 machine-related fatalities. The leading cause of a machine-related death was being crushed in/by the machine; six (23.1%) individuals were crushed in/by the machine. Five (19.2%) individuals were caught between the machine and another object (fence post, ceiling pipe, ride counterweight, train engine/empty car, tractor backhoe). Four (15.4%) individuals were run over by a machine. Four (15.4%) individuals were fatally injured when the machine rolled over to the rear and one (3.8%) individual was killed when the machine rolled over to the side. Three (11.5%) individuals died due to entanglement in the machine. Two (7.7%)

individuals died when an object fell from or was set in motion by the machine. Mechanical asphyxiation was the cause of the machine-related fatality for one (3.8%) individual.

Motor Vehicle Related Deaths

There were 29 motor vehicle related fatalities in 2004. There were 27 incidents. In two incidents, both the vehicle's driver and passenger were killed. In three incidents, the victim was a pedestrian. And in two incidents, the passenger was the victim and the driver of the vehicle survived the crash.

Work-related deaths involving motor vehicles usually were two-unit incidents (10, 37.0%) followed by single unit incidents (9, 34.6%). Five 3-unit incidents (18.5%), two 4-unit incidents (7.4%), and one 5-unit incident (3.7%) were involved in the remaining work-related deaths. A "unit" is identified as a motor vehicle, bicycle, pedestrian, or train involved in the crash and individually reported; therefore, a car-animal crash or a car-tree crash is categorized as a single-unit incident.

The crash type was identified as single motor vehicle in 11 (42.3%) incidents, rear-end crashes in seven (26.9%) incidents, angle in four (15.4%), head-on in two (7.7%) incidents, sideswipe in one (3.8%) incident, and other (pedestrian struck on the highway) in one (3.8%) incident. The responding police agency did not complete the crash type on the UD-10 for one individual. A single motor vehicle includes those cases in which a motor vehicle was (1) the only traffic unit and (2) the only motor vehicle involved collided with a bicyclist, pedestrian, animal, railroad train or any other non-motorized unit.

The majority of crashes occurred during daylight hours (18, 69.2%). Seven (26.9%) occurred at night; one of the nighttime crashes occurred on a road that was lit and six occurred on unlit roads. Two (7.4%) crashes occurred at dusk. The weather was cloudy in 12 (46.2%) incidents, clear in 12 (46.2%) incidents, raining in one (3.8%) incident and snowing/blowing snow in one (3.8%) incident. Weather conditions were unknown in one incident.

Most crashes occurred primarily on two-lane roads (16, 59.3%). Five (18.5%) crashes occurred on roadways with four lanes, four (14.8%) crashes occurred on roadways having three lanes, one (3.7%) occurred on a roadway having seven lanes, and one (3.7%) crash occurred in a parking lot. Roadway surface conditions are known for 26 of the 27 incidents. In 19 of the 26 (73.1%) incidents, the roadway was dry. Roadway surface conditions may have been a factor in seven of the 26 (26.9%) incidents. The roadway surface was wet in four (15.4%) incidents, icy in one (3.8%) incident, snowy in one (3.8%) incident, and rutted and stony in one (3.8%) incident.

Excluding pedestrian deaths, the speed limit was 70 miles per hour in seven (29.2%) incidents, 55 miles per hour in seven (29.2%) incidents, 35 miles per hour in five (20.8%) incidents, 45 miles per hour in two (8.3%) incidents, 60 miles per hour in one (4.2%) incident, 50 miles per hour in one (4.2%) incident, and 20 miles per hour (parking lot speed) in one (4.2%) incident. Speed limit signs were posted on 20 (83.3%) of the roads where a death occurred and not posted in four (16.7%). Two pedestrian deaths occurred within a road construction zone; one construction zone did not have speed limits and speed signage posted and for one construction

zone, speed limits and signage was unknown. For one pedestrian death (struck on side of highway), the speed limit was 70 miles per hour and speed limit signs were posted.

Restraint system use (seat belt/shoulder harness) was identified by the responding police agency for 18 of the individuals who died. The use of a restraint system was not applicable for six victims (three pedestrians, two motorcyclists, and one individual driving a tractor that was not equipped with a ROPS/seatbelt system). The responding police agency indicated restraint use as unknown for four victims and for one victim the police did not indicate whether a restraint system was used. Seat belt/shoulder harness use by the victims was evenly split; nine individuals (50.0%) were wearing a shoulder and lap belt at the time of the fatal injury and nine individuals were not wearing a shoulder or lap belt at the time of the fatal injury. Six of the nine (66.7%) individuals who were not wearing a shoulder or lap belt were ejected from the vehicle; three (33.3%) individuals remained within the vehicle.

The presence or absence of airbags in the vehicle was identified for 20 (76.9%) vehicles. The presence or absence of an airbag was not applicable in six instances (pedestrians, motorcyclists, tractor operator) and was unknown for one vehicle. An airbag was present in 14 (70.0%) of the vehicles involved in fatal incidents; six (30.0%) vehicles were not equipped with an airbag. The airbag deployed at the time of the crash in seven of the 14 (50.0%) vehicles with an airbag, and did not deploy in seven vehicles.

The victim was the driver of the vehicle in 22 of the 27 (81.5%) incidents. The driver's condition was indicated by the responding enforcement agency as appearing normal in five (22.7%) incidents; this included one crash that killed both the driver and the passenger. The driver's condition was indicated as unknown in 16 incidents including the other multiple fatality incident. The condition of one driver may have contributed to his death; he was described by the responding enforcement agency as distracted.

For five incidents, the victim was not driving the vehicle. One vehicle driver fell asleep while driving and struck a pedestrian. The other two drivers of the vehicles that struck the pedestrians who were killed at work were described by the responding police agency as appearing normal as did the surviving driver of the vehicles in which a passenger was killed. The condition of the other surviving driver was identified by the responding enforcement agency as unknown.

The type of vehicle involved in the fatal injury could be identified in all 27 incidents. A truck/bus was involved in 10 (37.0%) incidents. A passenger car was the vehicle being used in five (18.5%) incidents. A police car and a pickup truck were involved in three (11.1%) incidents each. A small truck (<10,000 pounds) and motorcycles were involved in two (7.4%) incidents each. A van and a piece of farm equipment were involved in one (3.7) incident each.

The investigating enforcement agency records whether the driver action(s) contributed to the crash (hazardous action). Hazardous action taken by the driver of the vehicle involved in the incident was identified in 18 of the 22 (81.8%) incidents where the driver was a victim; both the driver and passenger were killed in one of the 18 incidents. Hazardous action was unknown in four incidents; one of the four includes an incident where both the driver and passenger were killed. In eight of the 18 (44.4%) crashes, no hazardous action was noted in the opinion of the

responding enforcement officer. In four of the 18 (22.2%) crashes, the driver of the vehicle was driving too fast. The driver was unable to stop in an assured clear distance in two (11.1%) incidents. In two (11.1%) incidents, the hazardous action was described as "Other". In one (5.6%) incident, the driver was identified as driving recklessly, and one (5.6%) driver was described as being careless/negligent.

The hazardous action of one of the three drivers that struck a pedestrian was identified as careless/negligent. For one driver, the hazardous action information was not completed on the State of Michigan Traffic Crash Report. The responding police agency identified the hazardous action as unknown for one driver.

The hazardous action of one of the drivers of the vehicle in which the passenger was killed but the driver survived was recorded by the police agency as driving too fast for conditions. The hazardous action was identified as driving left of center for one driver.

All motor vehicle work-related fatalities were classified into three broad categories: non-collision, collision with a non-fixed object, and collision with a fixed object. Five (18.5%) non-collisions occurred; the vehicle overturned in three incidents, the driver lost control in one incident and in one incident, the vehicle caught fire. Sixteen (59.3%) collisions with a non-fixed object occurred. Twelve (75.0%) of the 16 collisions with a non-fixed object involved a collision with a moving motor vehicle in transport. The vehicle struck a pedestrian (victim) in three (18.8%) incidents. The vehicle's driver collided with a parked motor vehicle in one (6.3%) incident. Collisions with a fixed object occurred in six (22.2%) of the 27 motor vehicle work-related incidents. Two (33.3%) of the six collisions with a fixed object involved a tree, one (16.7%) incident involved a bridge abutment, one (16.7%) incident involved a luminary/light support, one (16.7%) incident involved a utility pole, and one (16.7%) incident involved a building.

Struck By

Thirteen individuals were fatally injured when an object struck them. Steel beams fell onto two (16.7%) individuals. Eleven single struck by incidents involved the following objects: collapsing concrete masonry cellar wall, dirt from a collapsing trench wall, gas hose flailing under high pressure, piece of hardened lime that fell from a bunker silo, a machine being placed into position, losing control on a ski slope and hitting a tree, steel plate that came loose from the slings, utility poles being moved by a tractor, hoist motor that fell, debris from exploding motor and coil of steel cable.

Suicides

Four individuals committed suicide while at their workplace from self-inflicted gunshot wounds.

Toxic Exposures

Five individuals died due to a toxic exposure while working. Two individuals died from drug intoxication while at work; one from acute cocaine intoxication and one from methadone

intoxication. Two individuals experienced a fatal asthma attack; one while cleaning a bulk milk tank and one while working in a bar. One individual died when he was overexposed to carbon monoxide while working in a dwelling being heated by propane.

MIOSHA Fatality Investigations

The 131 individuals who died worked for 127 employers. Ninety-one (69.5%) individuals were identified as employees. Five (3.8%) individuals were identified as contract/temporary employees. Thirty-four (26.0%) individuals were identified as either self-employed or the business owner. One individual was a youth who was working on his family farm.

Four employers had a fatal incident where more than one person died during the incident. Two incidents were transportation-related. Two of the three transportation-related incidents were motor vehicle deaths where both the driver and passenger died. One employer had two individuals killed by gunfire (homicide) during the same incident. One employer had two individuals fall to their death while working on the same job at a construction site.

For each company that had a work-related fatality, the Federal OSHA Integrated Management Information System (IMIS) was accessed to determine the previous MIOSHA compliance activity at the company. The IMIS database identified that four (3.1%) of the 127 employers had another work-related fatality prior to 2004. Two were Public Administration employers, one of the employers was in Construction, and one was in Manufacturing. One Public Administration employer had similar fatalities (homicides) in 2001 and 2002. The other Public Administration employer had a fatality during a traffic stop in 1971. The Construction employer had an employee fall from a communication tower in 1993. The Manufacturing employer had an employee killed in 2001 from an explosion.

MIOSHA investigated 44 of the 131 work-related fatality cases (33.6%). The 44 deaths occurred at 43 of the 127 (33.9%) employers that had a work-related fatality in 2004.

The IMIS database identified that 20 of the 43 (46.5%) employers had a previous MIOSHA Occupational Health, General Industry Safety or Construction Safety compliance inspection. Seven (35.0%) of the 20 companies had received an Occupational Health inspection. These seven companies had previously been inspected one to five times. Citations were issued to five of the seven companies during the previous inspection; if conditions warrant, a company can receive multiple citations as a result of a MIOSHA inspection. For the five companies receiving an Occupational Health citation, one company received citations categorized as Serious, Repeat and Other, and four companies received citations categorized as Other.

Seven (35.0%) of the 20 companies had received a General Industry Safety inspection. These seven companies had previously been inspected one to five times and all received citations. Four companies received citations classified as Serious and Other, one company received citations classified as Serious, Repeat, and Other, one company received citations classified as Serious, and one company received citations classified as Other.

Twelve companies were identified as previously receiving a compliance inspection from the MIOSHA Construction Safety division. Eight of 12 (66.7%) that had received a previous Construction Safety inspection had been inspected one to five times, two companies (16.7%) had been inspected six to ten times, and two companies (16.7%) had been inspected more than ten times. Citations were received by eleven of the twelve of the companies during these inspections. Six of eleven companies received citations classified as Serious and Other, one company received a citation classified as Serious, three companies received citations classified as Serious, Repeat and Other, and one company received citations classified as Serious, Willful and Other.

MIFACE requested and received permission, and conducted a work-related fatality investigation at 10 facilities. Copies of the MIFACE reports and 38 summaries of MIOSHA inspections are available on the MSU OEM web site. Select on the MIFACE link to view the reports and summaries (www.oem.msu.edu/).

Hispanic Initiative

The US Department of Labor, Bureau of Labor Statistics (BLS) has analyzed the Census of Fatal Occupational Injury (CFOI) data and reported a higher fatal work injury rate for Hispanic workers than for other racial/ethnic groups. As a result, Federal OSHA is currently collecting additional information during all investigations that includes the primary language and country of origin of the victim. OSHA has also formed the Hispanic Worker Task Force that includes hazard awareness and workplace rights.

In partnership with Federal OSHA, NIOSH has added Hispanic worker fatalities to the list of current targets for the Federal in-house FACE program. Information gathered will be made available to the OSHA Hispanic Worker Task Force. The Michigan FACE program supports the concept and rational of this initiative. As a result, we have utilized an Immigrant Workers/Limited English Speakers Workers investigation guide, which was developed in conjunction with the other FACE states, during on-site investigations.

There were five deaths of Hispanic workers in Michigan in 2004. Using the United States Census Bureau population estimates for the Caucasian, African-American, and Hispanic populations in Michigan for 2004, this was a rate of 2.1 per 100,000 for 16-65 year old Hispanics as compared to a rate of 1.7 per 100,000 for 16-65 year old Caucasians and 1.6 per 100,000 for 16-65 year old African-Americans.

In 2004, two Hispanics died in the Health Care and Social Assistance industry (homicide, motor vehicle), two Hispanics died in Construction-related incidents (struck by an object, toxic exposure), and one Hispanic died in a Wholesale Trade incident (motor vehicle). All companies that had a Hispanic work-related fatality declined to participate in the MIFACE research program.

Case Narratives

Based on the information collected during MIFACE on-site investigations and/or from source documents, a brief narrative summary organized alphabetically by means of death of each of the

131 acute traumatic work-related deaths in 2004 is included in Appendix I. Table 14 gives the case narrative number and means of death by NAICS code. When a brand name of equipment is known, MIFACE included this information in the narrative; this does not signify that there was a defect or other problem with the machine (unless noted).

Comparison to the Census of Fatal Occupational Injuries Data

The Census of Fatal Occupational Injuries (CFOI) is the surveillance system funded in every state by the United States Department of Labor Bureau of Labor Statistics (BLS). CFOI reported three more deaths in 2004 than MIFACE. MIFACE determined after obtaining information from MIOSHA, medical examiner, and police reports that the causes of these three deaths were not due to a traumatic work injury.

One of the three deaths involved a 69-year-old male farmer who became trapped inside of a grain elevator while attempting to move a plate used to direct the flow of corn. The victim had sold the elevator to the current owners, but he continued to visit the elevator to keep busy. He was not considered an employee or volunteer worker. On the day of the incident, the elevator owners were unaware that the individual was present.

The second death involved a 36-year-old retail sales clerk who was hanging signs at the department store where she worked. Although one report of this death indicated she fell from a ladder, this report could not be substantiated. She had indicated to fellow coworkers that she was not feeling well the previous day and the morning of her death. The autopsy report did not indicate any signs of trauma as a result of a fall and attributed her death to a medical condition.

The third death occurred when a 10-year-old boy was run over by a family member's truck in a farm field. None of the three reports describing the death indicated the child had been working: one report indicated he was playing in the field, one report stated that the family member did not know what the child was doing, and another report stated that the mother was bringing lunch to the workers and family members working in the field. Because it was unknown if the child was working, MIFACE did not categorize this death as work-related.

A fourth death not counted as work-related by either MIFACE or CFOI was a 4-year-old child who was with her parents working in a farm field. The girl was crushed under a loaded hay trailer. Family members had parked the tractor, bailer and wagon for repairs. When the bailer was fixed, the adults counted the children to make sure everyone was clear. All the children were told to go up by the truck. Her older sister went to the truck, but the victim hid under the trailer. The tractor, baler and wagon began to back up and the victim was run over by the tractor.

Discussion

There were 131 acute traumatic work-related fatalities in Michigan in the year 2004. One incident in 2003 resulted in a death in 2004. The major sources for identifying acute traumatic work-related deaths were the 24-hour MIOSHA hotline, a newspaper clipping service, the State Police vehicular data reporting system, and death certificates.

There were on the average 2.5 acute traumatic work-related fatalities per week although the deaths were not evenly distributed throughout the year. October was the most common month for the occurrence of a fatal traumatic injury (20 incidents) and September was the second most common month (18 incidents).

Individuals who died from an acute traumatic work-related fatality were most likely to be men (92%), white (79%), married (58%) and had at least a high school education (53%). The average age of death was 44 but ranged from 6 to 88, with one child less than 18 and 15 seniors 65-88 years old.

The largest number of deaths occurred in Construction (32, 24.4%). Mining (2, 1.5%) and Agriculture (15, 11.5%) had a higher *risk* of acute traumatic work-related fatalities. The rate in Mining was 31.3 deaths per 100,000 workers and in Agriculture the incidence rate was 18.8 deaths per 100,000 workers as compared to 16.8 deaths per 100,000 workers in Construction (Table 9). Despite the high fatality rate in Agriculture, farms with fewer than 11 employees are exempted from many workplace regulations.

Illegal drugs and/or alcohol were found on autopsy in approximately 16% of acute work-related fatalities. Alcohol was found in 9 individuals and 11 tested positive for illegal drugs. In six individuals (5.0%), the side effects of prescribed and over-the-counter medications may have been a factor in the death.

MIOSHA investigated 44 (33.6%) of the deaths. The local police, county sheriff and state police investigated 56 (42.7%) deaths. Federal agencies including the National Safety Transportation Board, Mine Safety and Health Administration, and Occupational Safety and Health Administration investigated nine (6.9%) of the deaths. There were 22 (16.8%) deaths not investigated by a regulatory agency as to cause of death other than by the police to exclude a homicide or suicide. MIFACE is a research effort and relies on the voluntary cooperation of employers and for the self-employed, their family members. MIFACE attempted to investigate 19 of the 22 work-related fatalities not inspected by a regulatory or enforcement agency. MIFACE conducted an on-site investigation at four of these employers and was denied the opportunity for a site visit at the 15 of the 19 employers.

Copies of the completed MIFACE investigations are on our web site www.oem.msu.edu/. MIFACE summaries of investigations conducted by the Michigan OSHA program are also on the same web site. For each report there is a dissemination plan to maximize awareness of the report. Reports are sent to appropriate trade associations, unions, trade journals and in some cases other employers doing the same type of work. A special effort in conjunction with the Michigan Farm Bureau to provide educational sessions to farmers is ongoing.

Traumatic occupational fatalities are an important public health issue in Michigan as they are throughout the United States. There were 21 fewer deaths in 2004 than in 2003. Agriculture had 17 fewer deaths in 2004 compared to 2003. Retail Trade had a significant reduction in the number of deaths (12 in 2003 and 4 in 2004). The number of Manufacturing deaths rose to 19 in 2004 compared to 10 in 2003.

This latest decline in work-related fatalities in Michigan is larger than the variation seen in recent years (1996-155 deaths, 1997-174 deaths, 1998-179 deaths, 1999-182 deaths, 2000-156 deaths, 2001-174 deaths, 2002-152 deaths, 2003-151 deaths) and hopefully is indicative that the number of acute traumatic work-related fatalities is declining for the first time since accurate tracking of the number of deaths began in 1992. Traumatic occupational deaths are not random events. Information about the settings and circumstances in which work-related deaths occur is necessary to prevent their occurrence in the future.

Understanding the root cause of these tragic events and then sharing that information with stakeholders - from individuals to groups - is what makes these efforts worthwhile. If what we learn from any of these deaths can help prevent another death, then the surveillance program has been successful in its goal. Each of the 131 deaths in this report could have been prevented. An awareness of the hazards of one's job, the provision of safe equipment, and an attitude of safety-mindedness on the part of labor and management are critical to prevent future fatal events.

We are extremely appreciative of the support of the MDLEG MIOSHA Safety and Health officers, the employers, the families and the experts who have worked with us. We have received funds from the National Institute for Occupational Safety and Health to continue this program through 2006 and plan to continue to identify ways to prevent work-related traumatic deaths and share what we have learned with those who may benefit from this knowledge.

References

1. North American Industry Classification System (NAICS), 2002. Executive Office of the President, United States Office of Management and Budget. Lanham, MD: Bernan Press. Internet Address: www.census.gov/naics

2. *Standard Occupational Classification Manual: 2000*. U.S. Office of Management and Budget. Lanham, MD: Bernan Press; and Springfield, VA: National Technical Information Service. Internet Address: www.census.gov/hhes/www/occupation.html

This report was funded by the National Institute for Occupational Safety and Health under cooperative agreement #U60-CC521205-01

Page intentionally left blank

Table 1. Demographic Characteristics of Worker Deaths, Michigan 2004

Characteristic		Number of Deaths	Percent
Sex			
	Male	120	91.6
	Female	11	8.4
Race			
	White	104	79.4
	Black	18	13.7
	Hispanic	4	3.1
	Asian Pacific	4	3.1
	American Indian	1	0.8
Age			
	<20	3	2.3
	20-29	24	18.3
	30-39	23	17.6
	40-49	36	27.5
	50-59	24	18.3
	60-69	11	8.4
	70-79	8	6.1
	80-89	2	1.5
Marital Status			
	Never married	30	23.1
	Married	76	58.5
	Divorced	20	15.4
	Widowed	4	3.1
	Unknown	1	--
Education			
	Less than high school	23	18.1
	High School graduate	67	52.8
	Some College 1-4	31	24.4
	Post College 5+	6	4.7
	Unknown	4	--
Total		**131**	

Table 2. Number of Acute Traumatic Work-Related Fatalities by Age of Victim and North American Industry Classification System (NAICS) Code, Michigan 2004

	Age								
NAICS Code	**6-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80-89**	**Total**
Agriculture, Forestry, Fishing and Hunting (11)	1	0	1	2	1	5	3	2	15
Mining (21)	0	0	1	1	0	0	0	0	2
Construction (23)	1	10	3	11	4	1	2	0	32
Manufacturing (31-33)	0	4	3	4	4	3	1	0	19
Wholesale Trade (42)	0	1	1	1	2	0	0	0	5
Retail Trade (44-45)	0	0	1	1	2	0	0	0	4
Transportation and Warehousing (48-49)	0	3	4	4	4	2	0	0	17
Real Estate and Rental and Leasing (53)	0	0	0	0	1	0	0	0	1
Professional, Scientific, and Technical Services (54)	0	0	0	0	1	0	0	0	1
Administrative and Support and Waste Management and Remediation Services (56)	0	1	2	1	1	0	0	0	5
Educational Services (61)	0	1	0	0	1	0	0	0	2
Health Care and Social Assistance (62)	0	0	1	3	1	0	0	0	5
Arts, Entertainment and Recreation (71)	0	0	0	2	0	0	1	0	3
Accommodation and Food Services (72)	1	1	0	3	0	0	0	0	5
Other Services (except Public Administration) (81)	0	1	3	1	1	0	1	0	7
Public Administration (92)	0	2	3	2	1	0	0	0	8
Total	**3**	**24**	**23**	**36**	**24**	**11**	**8**	**2**	**131**

Table 3. Number and Percent of Acute Traumatic Work-Related Fatalities by Education Level and North American Industry Classification System (NAICS) Code, Michigan 2004

NAICS Code	Did Not Complete High School		Completed High School No College		Some College 1-4 years		Post College 5+ years	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Agriculture, Forestry, Fishing and Hunting (11)	6	(42.9)	7	(50.0)	1	(7.1)	0	--
Mining (21)	0	--	2	(100.0)	0	--	0	--
Construction (23)	7	(22.6)	18	(58.1)	4	(12.9)	2	(6.5)
Manufacturing (31-33)	3	(15.8)	10	(52.6)	5	(26.3)	1	(5.3)
Wholesale Trade (42)	0	--	4	(80.0)	1	(20.0)	0	--
Retail Trade (44-45)	0	--	1	(25.0)	3	(75.0)	0	--
Transportation and Warehousing (48-49)	5	(33.3)	6	(40.0)	3	(20.0)	1	(6.7)
Real Estate and Rental and Leasing (53)	0	--	0	--	1	(100.0)	0	--
Professional, Scientific, and Technical Services (54)	0	--	0	--	0	--	1	(100.0)
Administrative and Support and Waste Management and Remediation Services (56)	0	--	2	(40.0)	2	(40.0)	1	(20.0)
Educational Services (61)	0	--	2	(100.0)	0	--	0	--
Health Care and Social Assistance (62)	1	(20.0)	3	(60.0)	1	(20.0)	0	--
Arts, Entertainment and Recreation (71)	0	--	2	(66.7)	1	(33.3)	0	--
Accommodation and Food Services (72)	0	--	4	(80.0)	1	(20.0)	0	--
Other Services (except Public Administration) (81)	1	(14.3)	4	(57.1)	2	(28.6)	0	--
Public Administration (92)	0	--	2	(25.0)	6	(75.0)	0	--
Total*	**23**	**(18.1)**	**67**	**(52.8)**	**31**	**(24.4)**	**6**	**(4.7)**

*Education level was unknown for four individuals: two individuals in Transportation/Warehousing, one individual in Construction and one individual in Agriculture.

Table 4. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths, by North American Industry Classification System (NAICS) Code*, and for Homicides Separately, by Day of the Week, Michigan 2004

Day of Injury	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Transportation /Warehousing Deaths (NAICS 48-49)		Agricultural Deaths (NAICS 11)		Homicides	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Sunday	8	(6.2)	1	(3.1)	0	--	1	(5.9)	1	(6.7)	4	(18.2)
Monday	19	(14.6)	3	(9.4)	4	(21.1)	2	(11.8)	3	(20.0)	3	(13.6)
Tuesday	25	(19.2)	5	(15.6)	3	(15.8)	4	(23.5)	3	(20.0)	3	(13.6)
Wednesday	20	(15.4)	5	(15.6)	5	(26.3)	3	(17.6)	1	(6.7)	4	(18.2)
Thursday	25	(19.2)	9	(28.1)	3	(15.8)	3	(17.6)	2	(13.3)	1	(4.5)
Friday	21	(16.2)	5	(15.6)	3	(15.8)	4	(23.5)	3	(20.0)	5	(22.7)
Saturday	12	(9.2)	4	(12.5)	1	(5.3)	0	--	2	(13.3)	2	(9.1)
Total	**130****		**32**		**19**		**17**		**15**		**22**	

* Only industries with 15 or more deaths are included in the table.

** Day of injury was unknown for one individual.

Table 5. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths; by North American Industry Classification System (NAICS) Code*, and for Homicides Separately, by Month of Injury, Michigan 2004

Month of Injury	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Transportation /Warehousing Deaths (NAICS 48-49)		Agricultural Deaths (NAICS 11)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	8	(6.1)	2	(6.3)	1	(5.3)	0	--	1	(6.7)	0	--
February	7	(5.3)	0	--	1	(5.3)	0	--	1	(6.7)	4	(18.2)
March	11	(8.4)	2	(6.3)	2	(10.5)	1	(5.9)	2	(13.3)	1	(4.5)
April	6	(4.6)	0	--	1	(5.3)	2	(11.8)	0	--	0	--
May	12	(9.2)	3	(9.4)	1	(5.3)	2	(11.8)	0	--	1	(4.5)
June	17	(13.0)	3	(9.4)	2	(10.5)	2	(11.8)	4	(26.7)	2	(9.1)
July	10	(7.6)	3	(9.4)	1	(5.3)	3	(17.6)	0	--	0	--
August	6	(4.6)	2	(6.3)	0	--	2	(11.8)	1	(6.7)	2	(9.1)
September	18	(13.7)	4	(12.5)	1	(5.3)	2	(11.8)	3	(20.0)	5	(22.7)
October	20	(15.3)	8	(25.0)	3	(15.8)	1	(5.9)	3	(20.0)	5	(22.7)
November	10	(7.6)	3	(9.4)	3	(15.8)	2	(11.8)	0	--	1	(4.5)
December	6	(4.6)	2	(6.3)	3	(15.8)	0	--	0	--	1	(4.5)
Total	**131**		**32**		**19**		**17**		**15**		**22**	

***** Only industries with 15 or more deaths are included in the table.

Table 6. Number of Acute Traumatic Work-Related Fatalities by Means of Death and Month of Injury, Michigan 2004

Means of Death	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Aircraft						3	1						4
Animal										1			1
Asphyxiation											1		1
Electrocution						2	1		2	2			7
Fire/Explosion			1	1					1				3
Fall			2		3	2			1	5	2	1	16
Homicide		4	1		1	2		2	5	5	1	1	22
Machine			2	2	3	5	1	1	5	4	1	2	26
Motor Vehicles	3	1	2	2	3	1	5	1	4	2	4	1	29
Struck By	3		1	1	1	2	1	2		1		1	13
Suicide			2				1				1		4
Toxic Exposure	2	2			1								5
Total	**8**	**7**	**11**	**6**	**12**	**17**	**10**	**6**	**18**	**20**	**10**	**6**	**131**

Table 7. Number and Percent of Acute Traumatic Work-Related Fatalities for all Deaths; by North American Industry Classification System (NAICS) Code*, and for Homicides Separately, by 4-Hour Time Periods, Michigan 2004

Time of Day	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Transportation /Warehousing Deaths (NAICS 48-49)		Agricultural Deaths (NAICS 11)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
12:00 a.m.-3:59 a.m.	12	(9.8)	0	--	2	(11.1)	1	(5.9)	0	--	7	(33.3)
4:00 a.m.-7:59 a.m.	9	(7.3)	0	--	3	(16.7)	1	(5.9)	2	(16.7)	1	(4.8)
8:00 a.m.-11:59 a.m.	32	(26.0)	12	(38.7)	3	(16.7)	3	(17.6)	1	(8.3)	6	(28.6)
12:00 p.m.-3:59 p.m.	38	(30.9)	12	(38.7)	7	(38.9)	8	(47.1)	4	(33.3)	0	--
4:00 p.m.-7:59 p.m.	15	(12.2)	5	(16.1)	1	(5.6)	3	(17.6)	2	(16.7)	1	(4.8)
8:00 p.m.-11:59 p.m.	17	(13.8)	2	(6.5)	2	(11.1)	1	(5.9)	3	(25.0)	6	(28.6)
Total	**123****		**31**+		**18**+		**17**		**12**++		**21**+	

* Only industries with 15 or more deaths are included in the table.
** Time of injury was unknown for eight individuals.
+ Time of injury was unknown for one individual.
++ Time of injury was unknown for three individuals.

Table 8. Number and Percent of Acute Traumatic Work-Related Fatalities By County of Injury, Michigan 2004

County	Number	Percent	County	Number	Percent	County	Number	Percent	County	Number	Percent
Alcona	0	--	Dickinson	0	--	Lake	0	--	Oceana	1	(0.8)
Alger	0	--	Eaton	4	(3.1)	Lapeer	0	--	Ogemaw	0	--
Allegan	3	(2.3)	Emmet	1	(0.8)	Leelanau	1	(0.8)	Ontonagon	0	--
Alpena	0	--	Genesee	3	(2.3)	Lenawee	2	(1.5)	Osceola	0	--
Antrim	1	(0.8)	Gladwin	1	(0.8)	Livingston	1	(0.8)	Oscoda	0	--
Arenac	0	--	Gogebic	0	--	Luce	0	--	Otsego	1	(0.8)
Baraga	0	--	Grand Traverse	0	--	Mackinac	4	(3.1)	Ottawa	1	(0.8)
Barry	1	(0.8)	Gratiot	0	--	Macomb	12	(9.2)	Presque Isle	1	(0.8)
Bay	1	(0.8)	Hillsdale	0	--	Manistee	0	--	Roscommon	0	--
Benzie	0	--	Houghton	0	--	Marquette	2	(1.5)	Saginaw	3	(2.3)
Berrien	2	(1.5)	Huron	2	(1.5)	Mason	1	(0.8)	St. Clair	3	(2.3)
Branch	2	(1.5)	Ingham	3	(2.3)	Mecosta	0	--	St. Joseph	2	(1.5)
Calhoun	4	(3.1)	Ionia	1	(0.8)	Menominee	0	--	Sanilac	1	(0.8)
Cass	1	(0.8)	Iosco	0	--	Midland	0	--	Schoolcraft	0	--
Charlevoix	1	(0.8)	Iron	0	--	Missaukee	0	--	Shiawassee	1	(0.8)
Cheboygan	1	(0.8)	Isabella	2	(1.5)	Monroe	0	--	Tuscola	1	(0.8)
Chippewa	0	--	Jackson	3	(2.3)	Montcalm	0	--	Van Buren	0	--
Clare	0	--	Kalamazoo	2	(1.5)	Montmorency	1	(0.8)	Washtenaw	6	(4.6)
Clinton	2	(1.5)	Kalkaska	0	--	Muskegon	1	(0.8)	Wayne	34	(26.0)
Crawford	0	--	Kent	5	(3.8)	Newaygo	0	--	Wexford	0	--
Delta	0	--	Keweenaw	0	--	Oakland	5	(3.8)			

Table 9. Number of Acute Traumatic Work-Related Fatalities by North American Industry Classification System (NAICS) Code, Michigan 2004

NAICS Code	Number Of Deaths	Percent	Number Of Employees*	2004 Michigan Rate[a]
Agriculture, Forestry, Fishing and Hunting (11)	**15**	**11.5**	**79,883**	**18.8**
Crop Production (111)	11	8.4	50,170	21.9
Animal Production (112)	4	3.1	29,713	13.5
Mining (21)	**2**	**1.5**	**6,400**	**31.3**
Mining (except Oil and Gas) (212)	2	1.5	4,300	46.5
Construction (23)	**32**	**24.4**	**190,300**	**16.8**
Construction of Buildings (236)	3	2.3	46,000	6.5
Heavy and Civil Engineering Construction (237)	5	3.8	17,300	28.9
Specialty Trade Contractors (238)	24	18.3	127,100	18.9
Manufacturing (31-33)	**19**	**14.5**	**695,800**	**2.7**
Paper Manufacturing (322)	1	0.8	14,800	6.8
Printing and Related Support Activities (323)	1	0.8	18,400	5.4
Chemical Manufacturing (325)	2	1.5	28,000	7.1
Plastics and Rubber Products Manufacturing (326)	1	0.8	43,100	2.3
Nonmetallic Mineral Product Manufacturing (327)	2	1.5	16,400	12.2
Primary Metal Manufacturing (331)	2	1.5	27,500	7.3
Fabricated Metal Product Manufacturing (332)	2	1.5	82,900	2.4
Machinery Manufacturing (333)	1	0.8	75,900	1.3
Computer and Electronic Product Manufacturing (334)	1	0.8	19,200	5.2
Transportation Equipment Manufacturing (336)	6	4.6	257,300	2.3
Wholesale Trade (42)	**5**	**3.8**	**170,900**	**2.9**
Merchant Wholesalers, Durable Goods (423)	3	2.3	96,000	3.1
Merchant Wholesalers, Nondurable Goods (424)	2	1.5	50,000	4.0
Retail Trade (44-45)	**4**	**3.1**	**515,000**	**0.8**
Motor Vehicle and Parts Dealers (441)	1	0.8	63,100	1.6
Food and Beverage Stores (445)	1	0.8	88,700	1.1
Gasoline Stations (447)	1	0.8	26,200	3.8
Sporting Goods, Hobby, Book, and Music Stores (451)	1	0.8	24,700	4.0

NAICS Code	Number Of Deaths	Percent	Number Of Employees*	2004 Michigan Rate[a]
Transportation and Warehousing (48-49)	**17**	**13.0**	**103,900**	**16.4**
Air Transportation (481)	2	1.5	14,900	13.4
Rail Transportation (482)	2	1.5	5,100	39.2
Truck Transportation (484)	6	4.6	35,700	16.8
Transit and Ground Passenger Transportation (485)	2	1.5	**	**
Support Activities for Transportation (488)	3	2.3	**	**
Postal Service (491)	1	0.8	27,900	3.6
Warehousing and Storage (493)	1	0.8	15,400	6.5
Real Estate and Rental and Leasing (53)	**1**	**0.8**	**56,500**	**1.8**
Real Estate (531)	1	0.8	19,000	5.3
Professional, Scientific, and Technical Services (54)	**1**	**0.8**	**314,000**	**0.3**
Professional, Scientific, and Technical Services (541)	1	0.8	245,500	0.4
Administrative and Support and Waste Management (56)	**5**	**3.8**	**269,900**	**1.9**
Administrative and Support Services (561)	5	3.8	258,500	1.9
Educational Services (61)	**2**	**1.5**	**437,200**	**0.5**
Educational Services (611)	2	1.5	437,200	0.5
Health Care and Social Assistance (62)	**5**	**3.8**	**517,300**	**1.0**
Ambulatory Health Care Services (621)	1	0.8	161,500	0.6
Hospitals (622)	3	2.3	179,800	1.7
Social Assistance (624)	1	0.8	56,200	1.8
Arts, Entertainment, and Recreation (71)	**3**	**2.3**	**62,200**	**4.8**
Performing Arts, Spectator Sports, and Related Industries (711)	1	0.8	9,800	10.2
Amusement, Gambling, and Recreation Industries (713)	2	1.5	49,100	4.1
Accommodation and Food Services (72)	**5**	**3.8**	**341,100**	**1.5**
Accommodation (721)	1	0.8	34,500	2.9
Food Services and Drinking Places (722)	4	3.1	306,500	1.3
Other Services (except Public Administration) (81)	**7**	**5.3**	**178,600**	**3.9**
Repair and Maintenance (811)	4	3.1	42,900	9.3
Personal and Laundry Services (812)	2	1.5	41,600	4.8
Religious, Grantmaking, Civic, Professional, and Similar Organizations (813)	1	0.8	94,200	1.1

NAICS Code	Number Of Deaths	Percent	Number Of Employees*	2004 Michigan Rate[a]
Public Administration (92)	**8**	**6.1**	**252,700**	**3.2**
Justice, Public Order, and Safety Activities (922)	7	5.3	**	**
Regulation of Agricultural Marketing and Commodities (926)	1	0.8	**	**
Total	**131**		**4,191,683**	

* Source: For Agriculture: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. For all other Industry Categories: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Year: 2004. www.michlmi.org/LMI/lmadata/cesdata/AET/micaet03.htm, June 23, 2005.

** No Data provided on IES report.

[a] Rates calculated per 100,000 workers

Table 10. Number of Acute Traumatic Work-Related Fatalities by Means of Death and North American Industrial Classification System (NAICS) Code, Michigan 2004

NAICS Code	Aircraft	Animal	Asphyxiation	Electrocution	Fall	Fire/ Explosion	Homicide	Machine	Motor Vehicles	Struck by	Suicide	Toxic Exposure	Total
Agriculture, Forestry, Fishing and Hunting (11)		1		1	1			6	1	2	2	1	**15**
Mining (21)								2					**2**
Construction (23)				4	12			4	7	4		1	**32**
Manufacturing (31-33)	1				2		1	7	4	3	1		**19**
Wholesale Trade (42)						1		1	3				**5**
Retail Trade (44-45)							4						**4**
Transportation and Warehousing (48-49)	2		1	1	1		2	2	5	3			**17**
Real Estate and Rental and Leasing (53)						1							**1**
Professional, Scientific, and Technical Services (54)									1				**1**
Administrative and Support and Waste Management and Remediation Services (56)	1			1			1	2					**5**
Educational Services (61)							2						**2**
Health Care and Social Assistance (62)						1	2		1			1	**5**
Arts, Entertainment and Recreation (71)								1			1	1	**3**
Accommodation and Food Services (72)							3			1		1	**5**
Other Services (except Public Administration) (81)							4	1	2				**7**
Public Administration (92)							3		5				**8**
Total	**4**	**1**	**1**	**7**	**16**	**3**	**22**	**26**	**29**	**13**	**4**	**5**	**131**

Table 11. Number and Rate of Fatal Occupational Injuries by Industry Sector Michigan Rates Compared to US Rates, Michigan 2004

Industry*	Number of Fatalities	2004 Michigan Rate	2004 US Rate**
Agriculture, Forestry, Fishing and Hunting	15	18.8	30.1
Mining	2	31.3	28.3
Construction	32	16.8	11.9
Manufacturing	19	2.7	2.8
Wholesale Trade	5	2.9	4.4
Retail Trade	4	0.8	2.3
Transportation and Warehousing	17	16.4	17.8
Leisure and Hospitality	8	2.0	2.1
Educational and Health Services	7	0.7	0.8
Other Services (except Public Administration)	7	3.9	3.0
Financial Activities	1	0.5	1.2
Government	8	3.2	2.5
Professional and Business Services	6	1.0	3.2
Total	**131**		

* Source: For Agriculture: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. For all other Industry Categories: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Year: 2004. www.michlmi.org/LMI/lmadata/cesdata/AET/micaet03.htm, June 23, 2005.
** Census of Fatal Occupational Injuries Summary. US Department of Labor, Bureau of Labor Statistics, National Census of Fatal Occupational Injuries in 2004.

Table 12. Number of Acute Traumatic Work-Related Fatalities by Standard Occupational Classification (SOC), Michigan 2004

SOC Number	SOC Code	Number of Workers	Percent
11	**Management Occupations**	**20**	**15.3**
11-1000	**Top Executives**		
11-1021	General and Operations Managers	3	2.3
11-9000	**Other Management Occupations**		
11-9012	Farmers and Ranchers	14	10.7
11-9021	Construction Manager	1	0.8
11-9041	Engineering Manager	1	0.8
11-9199	Managers, All Other	1	0.8
17	**Architecture and Engineering Occupations**	**3**	**2.3**
17-2000	**Engineers**		
17-2141	Mechanical Engineers	1	0.8
17-2199	Engineers, All Other	2	1.5
19	**Life, Physical, and Social Science Occupations**	**1**	**0.8**
19-1000	**Life Scientists**		
19-1011	Animal Scientists	1	0.8
21	**Community and Social Services Occupations**	**3**	**2.3**
21-1000	**Counselors, Social Workers, and Other Community and Social Service Specialists**		
21-1023	Mental Health and Substance Abuse Workers	1	0.8
21-1093	Social and Human Service Assistants	1	0.8
21-2000	**Religious Workers**		
21-2011	Clergy	1	0.8
27	**Arts, Design, Entertainment, Sports and Media Occupations**	**1**	**0.8**
27-1000	**Art and Design Workers**		
27-1021	Commercial and Industrial Designers	1	0.8
29	**Healthcare Practitioners and Technical Occupations**	**1**	**0.8**
29-1000	**Health Diagnosing and Treating Practitioners**		
29-1131	Veterinarians	1	0.8
31	**Healthcare Support Occupations**	**1**	**0.8**
31-1000	**Nursing, Psychiatric and Home Health Aides**		
31-1011	Home Health Aides	1	0.8
33	**Protective Services Occupations**	**12**	**9.2**
33-1000	**First Line Supervisors/Managers, Protective Service Workers**		
33-1099	Health Care Support Workers, All Others	1	0.8

SOC Number	SOC Code	Number of Workers	Percent
33-3000	**Law Enforcement Workers**		
33-3012	Correctional Officers and Jailers	1	0.8
33-3051	Police and Sheriff's Patrol Officers	6	4.6
33-9000	**Other Protective Service Workers**		
33-9032	Security Guards	3	2.3
33-9092	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	1	0.8
35	**Food Preparation and Serving Related Occupations**	**4**	**3.1**
35-2000	**Cooks and Food Preparation Workers**		
35-2015	Cooks, Short Order	1	0.8
35-2021	Food Preparation Workers	1	0.8
35-3000	**Food and Beverage Serving Workers**		
35-3031	Waiters and Waitresses	1	0.8
35-9000	**Other Food Preparation and Serving Related Workers**		
35-9099	Food Preparation and Serving Related Workers, All Other	1	0.8
37	**Building and Grounds Cleaning and Maintenance Occupations**	**4**	**3.1**
37-1000	**Supervisors, Building and Grounds Cleaning and Maintenance Workers**		
37-1012	First-Line Supervisors/Managers of Landscaping, Lawn Service and Groundskeeping Workers	1	0.8
37-2000	**Building Cleaning and Pest Control Workers**		
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1	0.8
37-3000	**Grounds Maintenance Workers**		
37-3011	Landscaping and Groundskeeping Workers	1	0.8
37-3013	Tree Trimmers and Pruners	1	0.8
39	**Personal Care and Service Occupations**	**2**	**1.5**
39-1000	**Supervisors, Personal Care and Service Workers**		
39-1021	First-Line Supervisors/Managers of Personal Service Workers	1	0.8
39-3000	**Entertainment Attendants and Related Workers**		
39-3091	Amusement and Recreation Attendants	1	0.8
41	**Sales and Related Occupations**	**7**	**5.3**
41-1000	**Supervisors, Sales Workers**		
41-1011	First-Line Supervisors/Managers of Retail Sales Workers	2	1.5
41-1012	First-Line Supervisors/Managers of Non-Retail Sales Workers	1	0.8
41-2000	**Retail Sales Workers**		
41-2011	Cashiers	1	0.8
41-2022	Parts Salespersons	1	0.8
41-2031	Retail Salespersons	1	0.8
41-4000	**Sales Representatives, Wholesale and Manufacturing**		
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	1	0.8

SOC Number	SOC Code	Number of Workers	Percent
43	**Office and Administrative Support Occupations**	**3**	**2.3**
43-5000	**Material Recording, Scheduling, Dispatching and Distributing Workers**		
43-5021	Couriers and Messengers	1	0.8
43-5052	Postal Service Mail Carrier	1	0.8
43-5071	Shipping, Receiving and Traffic Clerks	1	0.8
45	**Farming, Fishing, and Forestry Occupations**	**2**	**1.5**
45-2000	**Agricultural Workers**		
45-2093	Farmworkers, Farm and Ranch Animals	2	1.5
47	**Construction and Extraction Occupations**	**28**	**21.4**
47-1000	**Supervisors, Construction and Extraction Workers**		
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	4	3.1
47-2000	**Construction Trades Workers**		
47-2021	Brickmasons and Blockmasons	3	2.3
47-2031	Carpenters	1	0.8
47-2061	Construction Laborers	3	2.3
47-2111	Electricians	4	3.1
47-2141	Painters, Construction and Maintenance	2	1.5
47-2181	Roofers	5	3.8
47-2221	Structural Iron and Steel Workers	1	0.8
47-3000	**Helpers, Construction Trades**		
47-3014	Helpers, Painters, Paper Hangers, Plasterers and Stucco Masons	1	0.8
47-3016	Helpers-Roofers	2	1.5
47-3019	Helpers-Construction Trades, All Other	1	0.8
47-5000	**Extraction Workers**		
47-5049	Mining Machine Operators, All Others	1	0.8
49	**Installation, Maintenance, and Repair Occupations**	**5**	**3.8**
49-3000	**Vehicle and Mobile Equipment Mechanics, Installers, and Repairers**		
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	2	1.5
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	1	0.8
49-9000	**Other Installation, Maintenance and Repair Occupations**		
49-9041	Industrial Machinery Mechanics	1	0.8
49-9044	Millwrights	1	0.8
51	**Production Operations**	**10**	**7.6**
51-4000	**Metal Workers and Plastic Workers**		
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators and Tenders, Metal and Plastic	1	0.8
51-4035	Milling and Planing Machine Setters, Operators and Tenders, Metal and Plastic	1	0.8

SOC Number	SOC Code	Number of Workers	Percent
51-4121	Welders, Cutters, Solderers, and Brazers	1	0.8
51-4199	Metal Workers and Plastic Workers, All Other	1	0.8
51-5000	**Printing Workers**		
51-5011	Bindery Workers	2	1.5
51-9000	**Other Production Occupations**		
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	1	0.8
51-9195	Molders, Shapers and Casters, Except Metal and Plastic	1	0.8
51-9196	Paper Goods Machine Setters, Operators and Tenders	1	0.8
51-9198	Helpers, Production Workers	1	0.8
53	**Transportation and Material Moving Occupations**	**24**	**18.3**
53-2000	**Air Transportation Workers**		
53-2011	Airplane Pilots, Copilots and Flight Engineers	2	1.5
53-3000	**Motor Vehicle Operators**		
53-3031	Driver/Sales Workers	1	0.8
53-3032	Truck Drivers, Heavy and Tractor-Trailer	12	9.2
53-3033	Truck Drivers, Light or Delivery Services	1	0.8
53-3041	Taxi Drivers and Chauffeurs	2	1.5
53-4000	**Rail Transportation Workers**		
53-4011	Locomotive Engineers	2	1.5
53-7000	**Material Moving Workers**		
53-7032	Excavating and Loading Machine and Dragline Operators	2	1.5
53-7051	Industrial Truck and Tractor Operators	1	0.8
53-7062	Laborers and Freight, Stock and Material Movers, Hand	1	0.8
Total		**131**	

Table 13. Number and Percent of Acute Traumatic Work-Related Fatalities by Means of Death, Michigan 2004

Means of Death	Number of Deaths	Percent
Aircraft	4 (2)*	3.1
Animal	1	0.8
Asphyxiation	1	0.8
Electrocution	7	5.3
Fire or Explosion	3	2.3
Fall	16 (15)	12.2
Homicide	22 (21)	16.8
Machine-Related	26	19.8
Motor Vehicles	29 (27)	22.1
Struck By	13	9.9
Suicide	4	3.1
Toxic Exposure	5	3.8
Total	**131 (125)**	

*Number in parentheses is the number of incidents.

Table 14. Narrative Case Number by Means of Death and North American Industrial Classification System (NAICS) Code, Michigan 2004

NAICS Code	Narrative Case Number
Agriculture, Forestry, Fishing and Hunting (11)	
Animal	5
Electrocution	11
Fall	24
Machine-Related	65, 66, 69, 70, 71, 76
Motor Vehicle-Related	95
Struck By	111, 116
Suicide	124, 125
Toxic Exposure	129
Mining (21)	
Machine-Related	60, 62
Construction (23)	
Electrocution	8, 9, 10, 12
Fall	17, 18, 19, 20, 22, 23, 25, 26, 28, 30, 31, 32
Machine-Related	61, 63, 72, 79
Motor Vehicle-Related	82, 92, 94, 98, 99, 104, 105
Struck By	117, 118, 119, 120
Toxic Exposure	130
Manufacturing (31-33)	
Aircraft	2
Fall	27, 29
Machine-Related	56, 58, 64, 68, 75, 77, 78
Motor Vehicle-Related	86, 88, 101, 108
Homicide	51
Struck By	110, 115, 121
Suicide	126
Wholesale Trade (42)	
Explosion	15
Machine-Related	80
Motor Vehicle-Related	85, 93, 102
Retail Trade (44-45)	
Homicide	41, 43, 47, 49
Transportation and Warehousing (48-49)	
Aircraft	1, 4
Asphyxiation	6
Electrocution	7

NAICS Code	Narrative Case Number
Fall	21
Homicide	42, 50
Machine-Related	67, 73
Motor Vehicle-Related	97, 100, 106, 107, 109
Struck By	112, 113, 122
Real Estate and Rental and Leasing (53)	
Explosion	16
Professional, Scientific, and Technical Services (54)	
Motor Vehicle-Related	87
Administrative and Support and Waste Management and Remediation Services (56)	
Aircraft	3
Electrocution	13
Homicide	35
Machine-Related	59, 74
Educational Services (61)	
Homicide	37, 39
Health Care and Social Assistance (62)	
Explosion	14
Homicide	40, 46
Motor Vehicle-Related	91
Toxic Exposure	127
Arts, Entertainment, and Recreation (71)	
Machine-Related	57
Suicide	123
Toxic Exposure	128
Accommodation and Food Services (72)	
Homicide	36, 44, 53
Struck By	114
Toxic Exposure	131
Other Services (except Public Administration) (81)	
Homicide	45, 48, 52, 54
Machine-Related	55
Motor Vehicle-Related	81, 90
Public Administration (92)	
Homicide	33, 34, 38
Motor Vehicle-Related	83, 84, 89, 96, 103

Figure 1. Age Distribution of 131 Acute Traumatic Work-Related Fatalities, Michigan 2004

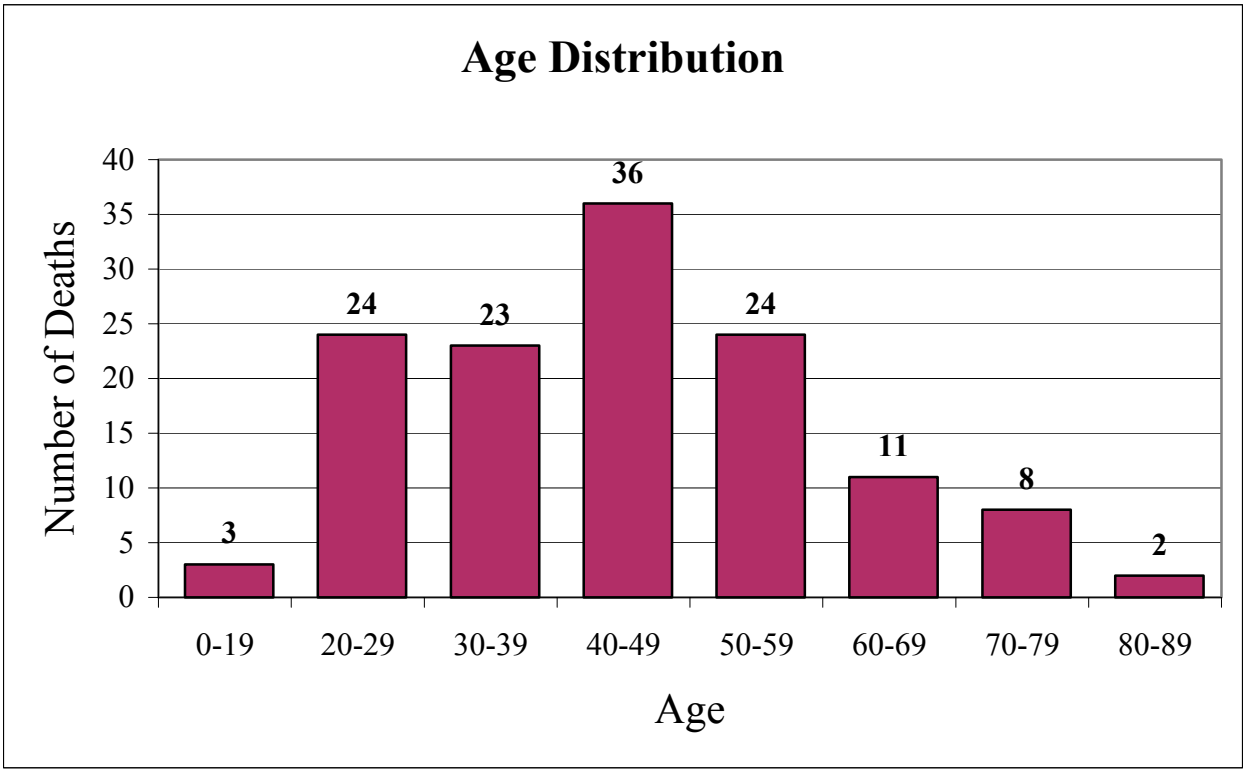


Figure 2. County Distribution of 131 Acute Traumatic Work-Related Fatalities By County of Injury, Michigan 2004

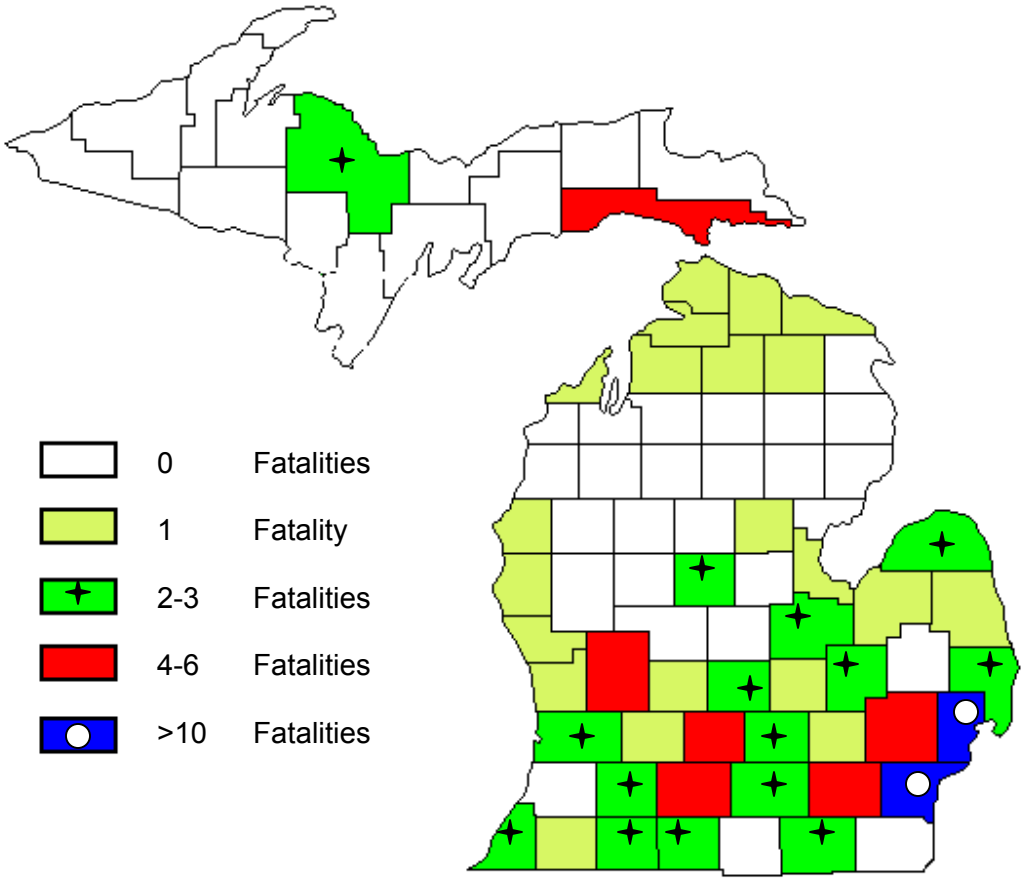
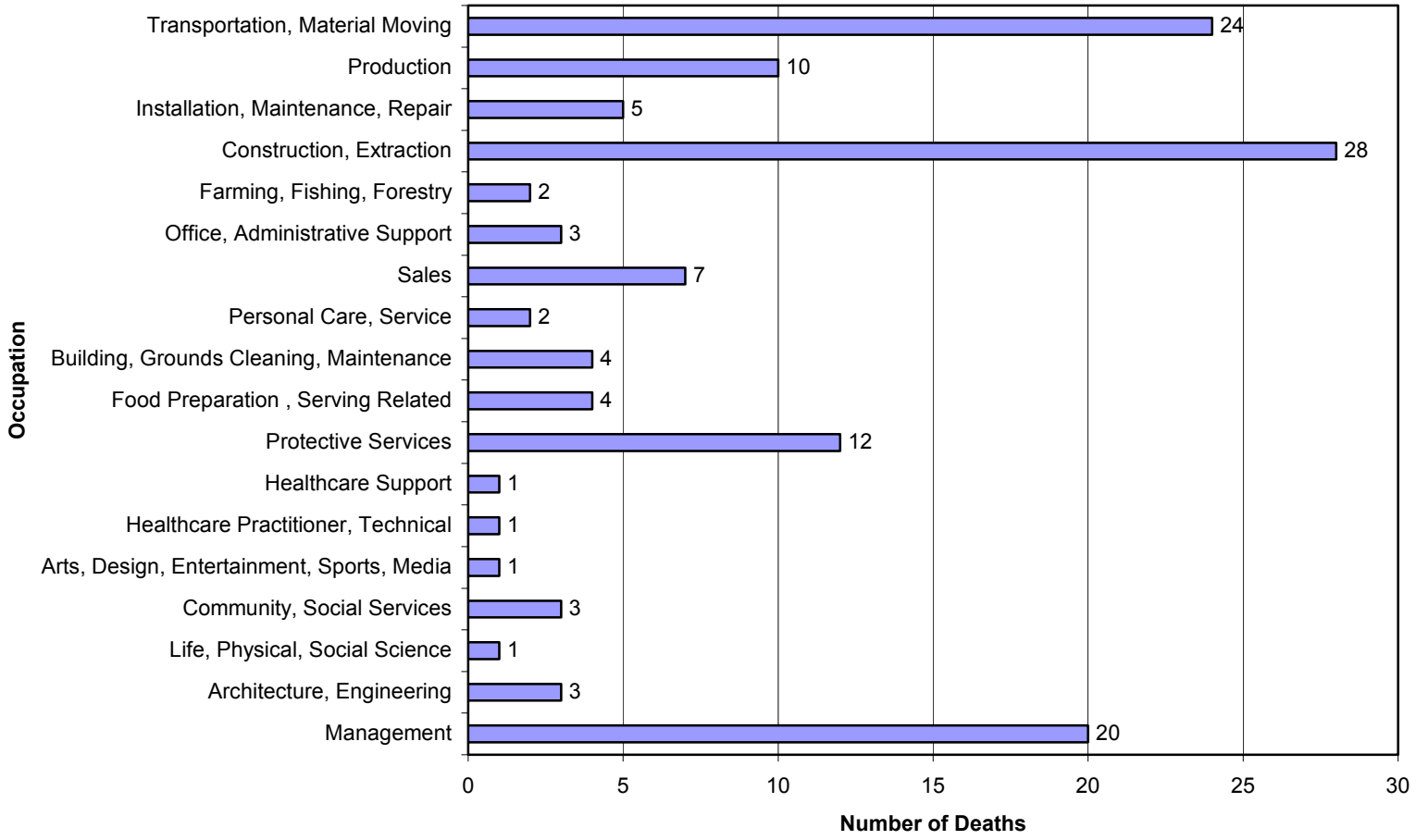


Figure 3. Work-Related Deaths by Standard Occupational Code (SOC), Michigan 2004



Page intentionally left blank

APPENDIX I

Page intentionally left blank

2004 Work-related Fatality Narratives

Aircraft (4)	
Case 1 Case 2 Case 3	A 52-year-old pilot and two passengers, ages 36 and 23, were traveling on business in a homebuilt plane. The National Safety Transportation Board (NTSB) website has the following description of the incident: "The airplane flew into a thunderstorm during cruise flight and subsequently entered a flat spin until impact with terrain. The airplane had been given a heading to avoid the adverse weather by Lansing approach control. During transfer of control between Lansing approach and Cleveland center, the Cleveland controller was advised that the aircraft had been given a heading to avoid the adverse weather. After the handoff, the Cleveland controller instructed the pilot to proceed direct to an en-route fix when able, but did not provide any information about radar-observed weather ahead of the aircraft. The Chicago center controller who next handled the airplane was briefed that the airplane was proceeding direct to the en-route fix and had not requested any weather deviations. About seven minutes after the handoff between Cleveland and Chicago centers, the pilot transmitted, 'Center this is uh 707SH what do you show us in up here?' Aircraft and weather radar data showed the accident airplane flew into an area of level six precipitation (extreme weather) prior to a rapid loss of altitude. Several witnesses reported first hearing the sound of a revving aircraft engine before seeing the airplane descending rapidly in a spiraling descent. A pilot-rated witness reported that the airplane was in a 'flat spin' before impacting the terrain. According to available pilot flight records, the pilot did not have a current biennial flight review and was not instrument current, as required by federal aviation regulations. No pre-impact anomalies were found with the airplane during the post-accident inspection."
Case 4	A 57-year-old male helicopter pilot was killed when the helicopter he was piloting crashed into a field. The National Safety Transportation Board (NTSB) website has the following description of the incident: "The helicopter impacted terrain while attempting to land at a National Guard Base following a reported vibration in the helicopter. The pilot contacted air traffic control (ATC) stating he was nine miles south of the base and requesting a clearance to transition through their airspace. The pilot was cleared through the airspace. When the helicopter was about 1 mile south of the base, the pilot reported to ATC that he was '... picking up a vibration.' The controller asked the pilot to repeat the transmission and the pilot stated, 'Yes sir the helicopter is starting to shake more violently sir.' The controller informed the pilot that he could land at the base if he pronounced an emergency. Approximately 3½ minutes later when the helicopter was two miles north of the base at 1,800 feet mean sea level (msl), the pilot reported that he was coming back to land. ATC cleared the pilot to land requesting if at all possible that the pilot land on the south side of the airport. The air traffic

	controllers viewed the helicopter through binoculars. They reported that they did not notice anything unusual with the helicopter and it appeared normal. One controller stated the helicopter crossed the northern end of the airport at 1,600 feet msl [1,020 above ground level (agl)]. Witnesses reported hearing the engine as the helicopter approached the airport. They stated that once the helicopter was approaching the south side of the airport, the nose pitched up then down. Witnesses described the descent angle as being between 45 and 70 degrees nose down. One controller estimated the descent began at an altitude of 1,400 to 1,500 feet msl [820 to 920 feet agl]. The helicopter impacted the grass leaving a wreckage trail approximately 299 feet long. Examination of the airframe, flight control systems, and engine did not reveal any failure/malfunction, which would have resulted in the accident. A sound spectrum examination was performed on a re-recording of the ATC communications to document engine, rotor, or vibration sounds on the tape. This examination revealed that the rotor system background sounds were consistent with the main rotor rating at about 101% rpm. These sounds were consistent throughout the recording including the transmissions after the pilot reported a vibration. In addition, the tape was examined to determine if any airframe or rotor system vibrations could be identified. There were no additional sounds or vibrations identified during any of the transmissions."
Animal (1)	
Case 5	A 43-year-old female farmer was killed while she was filling a horse-drawn manure spreader. She may have fallen from the spreader. She was trampled by the four horses pulling the spreader and/or was run over by the spreader itself.
Asphyxiation (1)	
Case 6	A 38-year-old male working as a mechanic for a truck carrier company was discovered by a coworker unconscious inside a tanker. He had apparently entered the tanker to repair a valve or seal that was leaking. Approximately two weeks prior to this incident, the tanker had been used to deliver methylene diisocyanate (MDI) to a chemical company. After the delivery, it had been washed and water-blasted to clean out MDI residue to prepare it for accepting and transporting toluene diisocyanate. Nitrogen under pressure was fed into the tanker to check it for its integrity. The nitrogen pressure check revealed a seal or valve leak. The tanker was returned to the truck carrier company for repair of the valve or seal leak. Apparently the mechanic, not aware that the tanker had been pressurized with nitrogen, entered it to make the repairs and passed out because of the lack of oxygen in the tanker. Appropriately attired rescue personnel removed him from the tanker. He was transported to the hospital where he was pronounced dead at approximately 6:00 p.m. The cause of death was recorded as death due to hypoxia due to the environmental conditions in which the body was found, coupled with the absence of any other explanation for sudden

	death. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 87.
Electrocution (7)	
Case 7	A 45-year-old male truck driver died from an electrocution when attempting to free a snagged communications wire from the top of his water delivery semi-trailer truck. The victim had delivered a load of water to a residence to fill a pool. Due to limited room for the vehicle on the limestone driveway and nowhere to turn the semi around, he began to back out of the driveway. The victim may have left one of the tanker hatches open. The long driveway had woods on both sides and he did not use a "spotter" as he backed out. His trailer made contact with an insulated cable television wire that was approximately 12 feet above the ground. He stopped the truck climbed on top of the tanker perhaps to check the clearance or clear the cable wires from the trailer. The trailer measured 11 feet 9 inches from the ground to the top of the tanker. The victim was apparently unaware that four feet above the phone line was an energized 14,400-volt electrical line. While on top of the tanker, the victim's upper body/shoulder contacted the electric transmission line. After contacting the energized wire, he fell to the ground and was found by the pool installer and the homeowners who heard an "electrical explosion." Emergency response arrived and he was transported to a local hospital where he later was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 59.
Case 8	A 47-year-old male commercial tech electrician died when he contacted an electrical cable energized with 240 volts, 50 amps. He and his partner were testing for a short in the cable, which was part of a tower light system near the intersection of two major expressways. A nearby tower light was not working. Both were wearing rubber gloves with leather liners. They were kneeling on damp ground without mats or insulating blankets. It had recently rained, humidity was high, and both men were sweating. Their procedure consisted of pulling the two 240-volt energized electrical tower light system cables up from a manhole. They would cut and test one cable at a time for a short. The testing was conducted by placing a 20-amp circuit breaker instrument that had been prepared in the shop for this purpose between the two ends of the cable. Finding no short, they spliced the cable to prepare it for re-insulation by crimping a sleeve over it. The victim was holding the ends of the cable while his partner spliced it. As the victim's partner looked away momentarily, he heard a noise. When he looked back, he saw the victim on the ground. He started CPR immediately. In the meantime, two county workers driving past on the expressway noticed that something

	was wrong and joined the worker. The police were contacted, and responded to the site. The police arrived and called for assistance. The victim was transported to a local hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 79.
Case 9	A 41-year-old male construction worker died when he was electrocuted while working in a trench installing a sanitary sewer. The victim was part of a six-person crew. The crew had removed an existing catch basin and a 12-inch old metal culvert so they could install piping between two manholes, manhole A and manhole B. The crew had completed installing manhole B and related piping, and had partially back filled the trench to the grade of the old existing culvert. The culvert was rigged for lifting by using a slip hook wire rope sling that was attached to the open hook on the bucket of a Kobelco Mark SK 300LC excavator. The operator rotated the excavator 180 degrees from manhole B, picked up the old culvert and was spinning back 180 degrees to the hole that was prepared. The victim and coworker #1 were walking and guiding the culvert as the operator was swinging the load around to the east. Coworker #2 was in the west end of the trench near manhole B and was handed the culvert end. The victim then proceeded to access the east end of the trench near manhole B while coworker #3 continued to position the culvert. Coworker #1, holding the east end of the culvert, was pushing his end to the victim when the top of the excavator's boom either made contact with an energized 7200-volt overhead power line that was 24 feet 8 inches above the road surface or there was an arc from the power line to the boom. The electrical current traveled through the boom, the bucket attached to a metal cable, the metal cable attaching the bucket to the culvert, the culvert, and then into the people touching the culvert. The victim was fatally electrocuted, coworker #1 received a severe shock and coworker #2 was burned. Emergency response was called and the victim was pronounced dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 84.
Case 10	A 27-year-old male construction laborer was electrocuted when the aluminum ladder-hoist he was moving contacted an energized overhead power line. He was a member of a six-person roofing crew that was roofing the east side of a two-story house. The crew arrived at the house at approximately 8:00 a.m. This was their fourth day at the worksite. An energized 3-phase, 7200-volt overhead power line ran north south on the east side of the house. The overhead line was approximately 26½ feet above grade and 11 feet from the side of the house. An aluminum ladder-hoist was used to raise material to the roof from the ground. The crew had completed the roofing operation on the north side of the roof.

	The crew's foreman instructed crew members to move to the east side of the house and the crew set up ladders for the ladder jack scaffold. The victim and another employee were instructed to move the 27-foot aluminum ladder-hoist from the west side of the house to the east side. It was sunny and the grass was dewy. They leaned the ladder-hoist against the northeast wall. While another coworker removed the motor from the ladder-hoist, the victim held the ladder. His coworker carried the south side of the ladder and the victim carried the north side. As they were moving the ladder-hoist to the center of the ladder jack scaffold, the top of the ladder portion of the ladder-hoist fell backward and contacted the energized 7200-volt overhead line, fatally electrocuting the victim and injuring his coworker. The employees were never warned about the power line nor was the utility company called. The foreman stated that he didn't think it was a high voltage line. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 69.
Case 11	A 50-year-old male farmer was electrocuted. He was found lying on his stomach over a steel pipe, which contained an electrically powered grain auger that was moving corn from a steel grain bin into a grinder. The grinder had a separate auger that was powered by a tractor PTO. An extension cord that was plugged into an ungrounded outlet that was not a ground fault interrupter-style outlet powered the auger unloading the grain from the grain bin. The extension cord ran approximately 50 feet from the barn across the yard to the auger. When in the yard, the cord was in standing water due to recent rains. When a family member discovered the victim, she stated that the wires were arcing. After discovering the victim, the family member ran into the barn, unplugged the extension cord at the wall outlet, shut down the tractor and checked on the victim. After checking on him, she called for emergency response. The police stated in their report that "upon examining the male and female sockets, there was significant, what appeared to be, fresh arcing from the prongs of the male plug. That arcing appears to be fresh because there's no corrosion showing, it is bright brass showing and the tips are partially melted off of the plug." Toxicology results indicated that he had 0.02% blood alcohol level.
Case 12	A 28-year-old male roofer was electrocuted while conducting work activities in the firm's second story metal working shop. The second story shop had a wooden floor with metal strapping that was part of the original building construction. The floor had grease, oil and dirt ground into the grain. The owner took his son (the victim) to work in the morning on the day of the incident to finish fabricating roof vents and vent piping. MIOSHA noted 10 partially completed roof vents on the workbench. There were five sections of vent piping scribed with a marker that were to be cut in half by a cut-off wheel installed on a right-

	angle grinder. The grinder was double insulated and connected to a 16-gauge, 25-foot long SJO extension cord. The cord was spliced, the ground prong was missing, and the extension cord was plugged into the duplex receptacle wall upside down (creating reversed polarity). The extension cord had multiple abrasions and tears in the jacket. The workbench had steel sheets laying on it. Stainless steel sheets standing vertically against a wall were in direct contact with steel sheets laying on the table and sheets lying on the floor. The victim's mother noted that the victim's boots were wet and muddy. It appeared that the victim was attempting to use a hand-held portable electric grinder and suffered an electric shock. The owner returned to the business after someone notified him that the business door was left open. When he arrived, he found the victim on his back, unresponsive. The grinder and extension cord were plugged in and the grinder was on the floor. Numerous electrical violations of equipment in the area, mainly of ungrounded and reversed polarity of electrical sources were discovered upon the MIOSHA inspection. A master electrician who accompanied the MIOSHA compliance officer measured about 105 volts to ground from the metal strap/table. The master electrician stated that the sidearm disconnect, which had four branch feeds to the second story workshop, were all ungrounded. He stated that the fuse panels were over-fused with 30-amp fuses and that 15-amp fuses should have been used in the panels. He also stated that 14-gauge wiring was used in the main fuse panel. There were no ground fault circuit interruption (GFCI) devices present, and a recommendation was made to install GFCI devices in work areas of the building. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 77.
Case 13	A 41-year-old self-employed male was electrocuted when he contacted the cab of his truck, which became energized with 7600 volts as a result of the boom on the truck contacting an overhead power line. The victim owned a flatbed truck with a three-section boom crane on the bed. The boom attachment was directly outside and behind the cab. The crane boom was 30 to 40 feet tall when fully extended. The scrap yard had truck ruts from other vehicle's movement and these ruts had standing water in them. The victim parked the truck under an energized 7600-volt electric line crossing from the main electric feed line. He was aware of the electric line above his truck. It was twilight. The victim and his helper off-loaded two heating and cooling units. While the victim was unhooking the last line and bringing the boom back up, the boom contacted the overhead line. When the crane contacted the line, a fireball came down the boom to the cab of the truck and started a fire. The victim and his coworker were on the wooden bed of the truck when the fireball started down the boom and "hit the ground." When the owner saw the cab on fire, he rushed over, stepped on the door's

	stepboard and contacted the door. The electric shock knocked him away from the truck and his helper pulled him further away and started CPR. Emergency response was called. The victim was transported by ambulance to a local hospital where he was pronounced dead. The summary can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 72.
Explosion (3)	
Case 14	A 53-year-old female caretaker of an elderly individual was killed in a house fire. The fire's origin was in the basement where the caretaker lived. It is unknown if fire detectors were present in the area of the fire. Toxicology results indicated that she had 0.169% blood alcohol level.
Case 15	A 25-year-old male scrap yard owner was cutting a strap around a gas tank with a cutting torch. The gas tank exploded and he received third degree burns over 60% of his body. He died approximately one week later from medical complications of the burns.
Case 16	A 52-year-old female janitor for a public housing commission died from burn injury complications. The victim was removing carpet glue from a concrete floor in the basement "den" area of a townhouse unit with a flammable lacquer thinner. The mechanical room contained the gas hot water heater and furnace, plumbing and electrical for a washer and dryer, and a laundry tub. The victim was using the flammable lacquer thinner on the floor to soften the carpet glue so she could remove it. Although both basement rooms had 17- by 11-inch windows, she did not open them. It is hypothesized that she poured the lacquer thinner on the floor. The vapors from the lacquer thinner migrated into the mechanical room, contacted the open flame of the hot water heater and flashed back and burned her. Her coworker working upstairs heard the victim scream and came to assist her. The coworker found the victim at the top of the basement stairs and assisted her outside. The coworker used her walkie-talkie to contact the housing commission office, and office personnel contacted 911. The victim was transported to a local hospital where she died approximately a week later. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI130.
Fall (16)	
Case 17	A 20-year-old male worker died as a result of a 27-foot fall through a roof skylight to a cement floor. He and several other workers were tarring the roof of the manufacturing building. He and some of the people he was with had been hired that morning and started working at approximately 9:30 a.m. The fall occurred at approximately 1:45 p.m. He was the bucket man. A worker on a lower level would place a bucket of tar on a rope. The victim would pull the bucket up to the roof and pour it into a large bin into which the others could dip their mops, or he would pour it directly onto the roof to be spread. According to one of

	the workers, to pour the tar from the bucket onto the roof, he would bend over and move from side to side, front to back. The bucket he was using was found five to ten feet from the skylight. According to the police report, his boot prints were evident in the "fresh tar on the roof leading directly from the east end of the roof to the broken skylight." His were the only prints leading to the skylight. Although others were on the roof, no one saw him fall through the skylight. It is possible that his feet became sticky from the tar and he tripped, or that he did not see the skylight and he tripped and fell into it. There were no warnings on the roof, nor were the workers using fall protection. He died in the hospital from multiple systems trauma on the day after his fall. Toxicological analysis of his blood indicated the presence of active and inactive metabolites of cannabis. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 54.
Case 18	A 41-year-old male electrician died after being catapulted from an elevated work platform while attempting to remove a flagpole. He was a member of a two-person crew. After arriving at the worksite in the afternoon, he discussed the flagpole removal with a representative of another company (Company B) and the onsite foreman from Company B. The victim was operating a vehicular-mounted, elevating work platform that was equipped with a hydraulic-powered winch on the end of the boom. The victim positioned the bucket truck so the rear of the truck faced towards the flagpole. The truck's position was approximately seven feet from a 208-volt service line. After setting the outriggers, the victim got in the bucket and elevated it approximately 35 feet to position himself near the top of the pole to attach the necessary rigging for removal. He hooked the nylon choker on the top just below the flagpole's ball, and hooked the braided nylon rope from the winch to the choker using a clevis. He placed the choker over the ropes, but when an employee from Company B questioned him, he relocated the choker under the ropes. He had not put on a safety harness before elevating himself. Once the rigging was in place, he attempted to pull out the flagpole using the hydraulic winch. The winch had a rating of 2000 pounds and the flagpole weighed approximately 200-300 pounds. The pole was relatively new and was a "friction fit." He was unable to lift the flagpole. Crewmembers from Company B started to hand dig the sand away from the base of the pole to possibly aid in the removal. At some point while he was attempting to lift the pole and as pressure was being applied, the winch's lifting rope broke. When the rope broke, the release of pressure on the boom catapulted the victim out of the bucket. As he fell, he struck the truck and then the ground. Emergency personnel transported him to a local hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on

	MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 83.
Case 19	A 34-year-old male painter was killed after falling approximately 90 feet from a high-tension transmission tower. The victim and three other coworkers were assigned to paint the tower. After climbing to the top, they took a break. The victim was wearing a lineman belt with a single six-foot lanyard. Prior to painting, the victim hooked his pelican hook to a structural steel angle that secured a cross member beam. This steel angle piece was missing a bolt. Company procedures required that the workers, before stepping onto a crossmember, kick the crossmember before stepping on it. It is unknown if the victim followed this procedure or if he did follow the procedure he may have not applied sufficient pressure. When the victim stepped onto the beam to begin his painting operation, the beam came apart from the tower, the angle gave way, and the beam bent. The victim fell from the beam and his hook and lanyard slipped off the end of the beam. The victim fell to the ground below. Toxicological analysis of his blood indicated the presence of inactive metabolites of cannabis in his urine and cocaine in his blood. Emergency personnel pronounced the victim dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 76.
Case 20	A 47-year-old male carpenter working at a residential construction site died as a result of striking his head on concrete. The victim was setting trusses approximately eight feet above the ground from the sill of a wall. He climbed down to the ground from the wall sill he was working from and was leaning against a wall. He then slid down the wall to a sitting position. He had no noticeable injuries although a fellow worker left to get him some ice. Someone left to obtain a portable Breathalyzer. The victim suddenly jerked striking his head on the concrete. He was in full arrest when the fire/rescue personnel transported him to the hospital. Closed head trauma was recorded as the cause of death. Toxicological analysis indicated a blood alcohol level of 0.18% and alcohol in his urine. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 58.
Case 21	A 38-year-old male train conductor fell from a boxcar and was pinned under the boxcar wheels. The victim was standing on a ladder attached to the first of six boxcars being pushed by the train's engine to another location. The victim's job was to alert the train conductor in the engine as to whether the train could safely cross over the tracks at road intersections. It had rained earlier that day. The victim stood on a ladder on the side of the boxcar to see potential traffic. As the train was approaching an intersection, the victim radioed to the conductor that it

	was all clear. The train conductor saw the victim "tumble" in front of the boxcar. The conductor immediately applied the emergency brake and called 911. The victim was pronounced dead at the scene. Toxicological analysis of his blood indicated the presence of active and inactive metabolites of cannabis and cannabinoids in his urine.
Case 22	A 32-year-old male project supervisor for a tower construction company was killed when he fell approximately 190 feet from a guyed cell tower. The tower was approximately 300 feet tall and was built in 2000. The victim was part of a three-person crew that was installing an antenna and 1-inch diameter coax cable. The victim and one of his coworkers accessed the tower by riding the hoist line near the top of the tower. They had finished setting the azimuth on one of the antennas and sealing them. The victim told his coworker he was going to go down the tower to put a U-bolt on one of the grounding connections and check the snap-in and/or butterflies on the coax cable. To descend, the victim was either free climbing or his fall protection equipment failed and he fell to the ground. A foot peg that was 192 feet from the ground was broken off at its outside nut. The tower had a fixed ladder safety climbing device cable and related hardware. The victim didn't have a climbing device cable grab on him when he fell. The victim's harness was a DBI/SALA Exofit in good condition. A 4½-inch swivel shackle block was connected on the left side of the harness at the time of the incident. The swivel shackle block's face was damaged in two areas; one of the areas appears to have bolt thread markings. The MIOSHA compliance officer found that the thread marks on the load block face were similar to the thread marks on the broken peg. Attached to the D-ring on the back of the victim's harness was a 1-inch web, 6-foot lanyard. The lanyard was deployed approximately four inches. At the end of the victim's lanyard was a pelican hook with the gatekeeper distorted approximately ½-inch laterally from center. The gatekeeper was outside the throat of the hook. The inside nose of the gatekeeper also had some distortion or markings. Also attached on the harness was a positioning device. The positioning device (separator hook or spreader bar) center attachment ring had a double-locking snap hook with a web lanyard attached. The other end of the lanyard had a double-locking snaphook attached to the swivel eyelet of a #18 rebar hook. The rebar hook had a faulty closure when checked. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 86.
Case 23	A 52-year-old male owner of a construction company died while unloading a 40-foot aerial boom lift truck from a trailer. He had delivered the aerial boom lift truck to the incident site. The trailer was a dual-axle trailer with two flip ramps mounted on the back. The width of the trailer from its outside edges was 76½ inches. The distance between the inside edges of the ramps was 50 inches. The distance between the

	inside wheels of the lift was 57½ inches. The victim was unloading the aerial lift from the trailer while in the lift platform without wearing a safety harness. The lift basket did not have a harness attachment point to which he could have anchored a safety harness. He did not have assistance in unloading the truck from the trailer bed. In order to unload the boom truck from the trailer, the victim would have had to raise the boom to allow the front tires to contact the ground. It is unknown how high the basket was raised. As he was driving it off the trailer bed, it appears that the lift truck's right side tires came off the right ramp to the inside. When this happened, the entire right side of the truck dropped to the ground causing the victim to be catapulted into the air, with his feet approximately three to four feet above the platform guardrail. While coming back down, he struck a steel support bar on the bucket. He collapsed at the bottom of the basket. A witness called 911 and began first aid measures. Emergency personnel arrived and the witness and emergency personnel lifted him out of the bucket onto the ground and initiated CPR. Emergency personnel took the victim to a local hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 85.
Case 24	An 88-year-old male farmer fell from a large tractor and struck his head. It appears he was trying to jump start his tractor with his car. The tractor was found approximately two-tenths of a mile away from the victim resting against a fence post. The key was in the "On" position and the gearshift was in neutral. The steel battery cover was on the hood of the tractor, leaving the battery compartment exposed.
Case 25 Case 26	A 56-year-old male teacher and 76-year-old male bakery salesman were members of a four-person work crew installing a metal roof over the existing roof shingles on a barn. The men had 2 years and 14 years experience re-roofing, respectively. They were installing 16 feet 6 inch long by 3 feet wide sheets of steel on the barn roof. Crewmember #1 was going down a ladder and did not witness the incident. Crewmember #2 was at the top of the sheet that was being installed. One of the victims was in the middle and the other victim was at the bottom of the sheet standing on a 19-foot high carpenters bracket scaffold. The scaffold work platform was approximately 68 feet long and 35 inches wide. The person at the top of the sheet had just started to put nails in the top of the sheet when he heard a noise and looked to see what was happening. He saw the two victims falling off of the scaffold to the concrete barnyard below. It appears that when the victim in the middle fell, he hit the second victim, causing them both to fall to the ground. Crewmember #1 attempted to call 911 from his cell phone but could not get a signal. He then drove to a nearby farm and had someone call 911. He returned and administered CPR until emergency response arrived. Both individuals were transported to area hospitals. Both were later

	pronounced dead at the hospital from massive internal injuries. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 73.
Case 27	A 52-year-old male printing shop bindery operator arrived at work at 5:30 a.m. and was walking to the time clock to punch in. In the aisle way he was walking through, there was a bar-type stool placed in front of a layout/drafting workbench. There was adequate lighting and aisle width for him to walk. He caught his foot on either the legs of a stool or the leg of the drafting table. He tripped, and as he was losing his balance, he bumped his left rib cage on a bindery machine. The victim performed his daily job duties for about a week, after which he called his employer stating he was sick. He was found dead in his home eight days after the fall. The medical examiner stated that the victim had died from internal bleeding. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 71.
Case 28	A 40-year-old male asphalt operator died as a result of a 30-foot fall while conducting a painting operation. The victim and his coworker were painting the exterior of two buildings owned by their employer. They had previously used a boom-supported aerial lift to access higher elevations. They were painting the buildings during their "off-hours." They had almost completed the painting operation, except for one area that was inaccessible with the aerial lift. They spoke with their employer and it was decided that a crane with a workbasket would be rented so that they could finish the work. On a weekend before the crane arrived at the site, the employees returned and painted a conveyor and dryer frame that did not require additional lifting equipment. It began to rain, so they informed their employer that they would return the following day to complete this work if weather permitted. The next day they completed the painting they had started the previous day. The only area that remained to be painted was the area where they would have had to use the crane. The victim and his coworker, instead of waiting for the crane delivery, used a rope they had found on the worksite and a fall protection harness they had used with the aerial lift to paint this area. The rope had visual defects and had been exposed to the weather. They tied a knot in the rope and hooked the short end of the lanyard into the rope and the other end of the lanyard was hooked to the "D" ring of the safety harness. The victim put on the safety harness; they were using the safety harness as a boatswains chair. They wrapped the rope around a permanent guardrail system that was located approximately 40 feet above the ground. The victim climbed over the guardrail, and as his coworker slowly "let out" the rope, he painted the wall as he was lowered to the ground. They successfully completed one

	pass. The victim climbed a ladder to his coworker's position to begin the process for a second pass. After he was lowered approximately 10 feet, the rope broke and he fell to the ground. As he fell, he struck his head on some piping and the building. His coworker above felt the rope go slack and looked over the guardrail. Seeing the victim on the ground, he called 911 and his employer. The victim was taken to a local hospital where he died approximately two weeks later from the injuries he sustained at the time of the fall. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 75.
Case 29	44-year-old male welder fell an unknown distance and struck his head on the floor. He was found on the floor, bleeding from the back of his head. He died as a result of subarachnoid and subdural hemorrhages.
Case 30	A 30-year-old male mason was killed when it appears he jumped from a 24-foot high scaffold that was beginning to collapse. Earlier in the day, he and three crewmembers had affixed a piece of heavy reinforced plastic, hung vertically, to the west side of the 100-foot long by 24-foot high welded-steel scaffold they were working from to provide a wind break. A windbreak was needed so the block wall they were going to begin constructing could be kept to temperature. After attaching the plastic sheeting to the top of the scaffold, they did not provide additional securement of the scaffold, such as cables to keep it in place. The wind speed increased, and it was decided that they should take the plastic off of the scaffold. As the workers were beginning to take down the plastic, the scaffold began to collapse. Two workers rode the scaffold to the ground and sustained minor injuries. The victim and another worker jumped to the frozen ground below. Emergency response was called and the victim was pronounced dead at the scene from head injuries. The other worker who jumped sustained serious injuries but survived. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 65.
Case 31	A 24-year-old male construction worker died after a 17-foot fall from a two-story house roof edge to the asphalt below. It was his first day of work on this job although he had been self-employed for a few years. He was not a roofer by trade; he was a concrete worker. The victim and his coworker arrived at approximately 8:00 a.m. to install an ice shield and drip edge along the bare plywood boards at the roof's edge. His coworker had previously installed a scaffold that was two sections high (approximately 13 feet high) at each end of the house and placed an aluminum pick between the scaffolds. While standing on the pick, he and his coworker could install the ice shield and the first three to four rows of shingles. The victim and his coworker climbed onto the scaffold and prepared to install the ice shield. The victim climbed onto the edge

	of the roof (4-foot elevation change) while his coworker stayed on the scaffold. The victim fell from the roof edge, hit the scaffold, and then fell to the ground. The victim and his coworker were not wearing safety harnesses. A ladder was not used to get to the roof from the scaffold. Emergency assistance arrived and the victim was transported to the hospital where he died. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 62.
Case 32	A 44-year-old male co-owner of a masonry company was on a 10-foot high scaffold when he stepped off of the scaffolding onto an aluminum extension ladder. Coworkers stated to the responding police agency that the ladder slid away as he was taking his first step, which caused him to lose his balance and fall 10 feet to the concrete below. The ladder also fell. He was revived by coworkers and taken to the hospital. The incident occurred in 2003. He died approximately three months later from injuries sustained at the time of the fall.
Homicide (22)	
Case 33 Case 34	A 21-year-old male police officer and a 26-year-old female police officer were killed by gunfire during a traffic stop.
Case 35	A 36-year-old male armored car guard was killed by gunfire during an ambush/robbery attempt after exiting an armored car.
Case 36	A 45-year-old male pizza deliveryman was killed by gunfire while sitting in his car after he delivered some pizzas.
Case 37	A 29-year-old male martial arts instructor/co-owner of a martial arts studio was killed by gunfire in his martial arts studio.
Case 38	A 30-year-old male police officer was killed by gunfire while completing a traffic report in his patrol car in the parking lot of a shopping center.
Case 39	A 51-year-old male food service employee was killed by gunfire when he approached two unidentified people trying to steal the tire rims off of his car.
Case 40	A 44-year-old female security supervisor was killed by gunfire by a coworker after an argument at work.
Case 41	A 54-year-old male gun shop owner was killed as a result of arson at his gun shop.
Case 42	A 29-year-old male cab driver was killed by police after he pointed an automatic handgun at the officers. The victim had driven through a red light and had been stopped by the police. During the stop, the cab driver drove off and was pursued by the police. The cab crashed into a retaining wall, and when the police officers approached the vehicle, the cab driver pointed an automatic handgun at the police. Toxicology results indicated that he had 0.11% blood alcohol level.
Case 43	A 31-year-old male gas station clerk was killed by gunfire during a robbery attempt at the gas station.
Case 44	A 28-year-old male police officer was killed by gunfire while off-duty

	and moonlighting as a bouncer at a bar.
Case 45	A 74-year-old male minister was killed by gunfire after he was robbed of his car keys in the church parking lot.
Case 46	A 49-year-old male counselor at a homeless shelter was stabbed by a homeless woman.
Case 47	A 43-year-old male used car dealership owner was killed by gunfire in the dealership's garage.
Case 48	A 38-year-old male nail salon owner was killed by gunfire in the nail salon's parking lot.
Case 49	A 56-year-old male party storeowner was killed by gunfire while he was standing out from behind a bulletproof glass during a robbery attempt.
Case 50	A 46-year-old male cab driver was killed by gunfire while in his cab.
Case 51	A 43-year-old male was killed after a coworker attacked him with a sword.
Case 52	A 37-year-old male was killed by gunfire in a dry cleaning store.
Case 53	A 43-year-old male was killed by gunfire at a restaurant.
Case 54	A 36-year-old male store employee was killed by gunfire during a robbery attempt.
Machine-Related (26)	
Case 55	A 25-year-old male mechanic died when he was pinned between a van and semi-truck's cab while unloading the van from the semi-truck's trailer. The victim drove the semi-truck to an auction site so three vehicles could be sold. He was assisted by employees of the auction site to remove the vehicles. The first vehicle was removed without incident. The second vehicle, a "cherry picker" utility truck was unloaded, parked next to the driver side door of the cab of the semi-truck, and left running. The remaining vehicle on the trailer was a van whose wheelbase was too long; therefore the rear tires would not fit completely on the elevated flat area of the trailer. The victim attached a tow chain from the back of the cherry picker to the van's front undercarriage to keep the van from rolling backwards off the trailer while he removed the van's tie downs. The victim was on the passenger side of the trailer removing the van's tie downs when an auction employee, wanting to move the cherry picker to another location, walked over to the cherry picker and asked the victim, "Are we all set with this one?" The victim replied, "Yes" but it appears his response was in reference to the tie down being removed, not that the cherry picker could be moved to another location. The auction employee got into the cherry picker, put it into drive, and moved forward. After traveling forward approximately two feet, he felt the vehicle "jerk" from behind. He stopped and backed up slightly. Placing the cherry picker into park, the auction employee got out of the truck and saw that the van was pulled forward off the trailer and that the front wheels were off of the trailer. The victim was pinned between the van and semi-truck's cab. The auction employees tried to pull the van back onto the trailer using another vehicle to free the victim but were unsuccessful.

	Emergency personnel arrived and took the victim to a local hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 63.
Case 56	A 37-year-old female furnace operator died when she was crushed between the substructure of a lift platform and the floor. The substructure supported the dump platform at a height of about 80 inches from the floor. The substructure and platform would rise to allow parts to be dumped, and then lowered. The dump station cycle including the rising, dumping, and lowering was between 3½ to 4½ minutes from the time two actuating buttons were initiated. The cycle was automatic, as the buttons did not require constant pressure. Because the substructure supporting the platform created exposed pinch points during the automated dumping, a metal mesh guarding originally secured with nuts and screws was placed around it. The mesh guarding surrounding the victim's station had been damaged by a forklift truck and was attached only at the top with nylon wire ties. She entered the area under the substructure while the dump station was in operation to retrieve three metal parts by lifting the mesh guarding from the floor. The parts had fallen either from the loaded parts bin, the lift platform, or during the dumping operation. She was trapped and crushed by the substructure on its downward cycle before she could get back out. The cause of death was blunt trauma, multiple injuries. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 55.
Case 57	A 44-year-old male maintenance technician died while replacing light bulbs on a carnival ride sign. A relief operator arrived and replaced the ride operator so he could have his scheduled break. The victim climbed up the side and onto the top of the ride gondola and was approximately 12-14 feet from the ground. The relief operator saw the victim climb onto the top of the gondola. When the ride operator returned after his ½-hour break at 8:45 p.m., the relief operator did not inform the ride operator that the victim was on top of the gondola. A customer came to use the ride and the operator started the ride from the ride's control panel. The victim apparently fell from the gondola as it started to move. The victim was caught between the moving counterweights and the stationary wall behind the ride. Emergency personnel transported the victim to a local hospital where he was pronounced dead. Toxicological analysis of his blood indicated the presence of inactive metabolites of cocaine. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 60.
Case 58	A 23-year-old male paper production maker was killed when his head

	was caught between a low hanging overhead water pipe and the fork-mast of a forklift that did not have overhead guard protection. The victim had completed forklift training provided by the company and was licensed to operate a forklift. A vacuum pump located in the basement was not working. After locking out the electric motor, a coworker loosened the motor mount bolts. The coworker and victim needed a forklift to move the motor to facilitate its repair. There was two inches of water on the basement floor and the operators could not see a plastic drainage grate in the floor that covered a 5-inch deep u-drain. As they maneuvered the truck into position, the left rear tire broke through the grate and caused the right front forklift tire to rise off of the ground. With the forklift still running and in reverse gear, the victim and his coworkers attempted to free the forklift from the grate by using a 74-inch long by 2-inch diameter pipe as a pry bar. One coworker was adding his weight to the front of the truck to bring the tire to the ground while another coworker was using the pry bar to lift the left rear tire from the drain. Once the right front tire moved down and touched the floor, the forklift began to move in reverse. At this point, the rear of the forklift was approximately eight feet from the overhead water pipe. The victim jumped onto the moving forklift behind the controls in the driver's position, with one foot on the side step and his head lined up behind the forklift's mast. The mast was in a fully lowered position; mast height was 72 inches. The victim was looking in the opposite direction of the forklift's travel. The forklift traveled approximately one to two feet with the victim in the operator's station before traveling under a 6-inch overhead water pipe that was approximately 74 inches above basement floor. As the forklift traveled under the pipe, the victim's head hit the overhead water pipe. His head was crushed between the overhead pipe and the forklift's mast. The forklift continued its reverse travel until it hit a wall. The forklift had been equipped with overhead protection but was removed to permit the forklift's use in the basement. The forklift was not required to have overhead protection when it was used in the basement. Emergency response was called and the victim was taken to a local hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 61.
Case 59	A 37-year-old male landscaper was killed when the zero-turn radius riding lawnmower he was operating went over a sea wall and landed on top of him in the water. The victim was a member of a two-person crew conducting lawn care activities at a lakefront home. He was operating a zero-turn radius Kubota riding lawnmower that weighed approximately 1,550 pounds. The victim began mowing at the northern edge of the property traveling down a shallow slope from west to east towards the lakefront. At the lake, he turned to the south and climbed a hill

	approximately 20 feet in height, which took him a short distance away from the water and along a rock garden. Measurements taken by MIOSHA showed an angle of 23 degrees downhill (east and west) with a cross slope angle of 15 degrees north and south. As the victim began to move away from the edge of the rock garden and back toward the lake, it appears that he began to have trouble slowing the mower ground speed on the long, damp grass. He continued towards the lake and the front wheels of the mower struck the sea wall. The sea wall rose about five to six inches above the level of the sod. The mower proceeded over the sea wall and tipped forward into the water, which was approximately two feet deep. As the mower went over the sea wall, it flipped over, throwing the victim into the water. The mower landed on top of him, pinning him under water. The homeowner witnessed the incident, called 911, called to the victim's coworker and also called the lawn care company. His coworker entered the water and tried to lift the mower but could not. Another nearby crew came to assist and together they were able to lift the mower and pull the victim from the water. Emergency personnel took the victim to a local hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 80.
Case 60	A 37-year-old male truck driver with four years mining experience was killed at a sand and gravel operation. The victim and two coworkers were dismantling a crusher for shipment to another mine site. A front-end loader, with a 15-foot long jib boom attachment on the bucket, was used to slightly lift the crusher discharge conveyor to relieve the load acting on two lock pins on the diagonal support members of the conveyor. A coworker was in the front-end loader supporting the conveyor as the victim attached the cable from the jib pole to the conveyer. The victim signaled the loader driver to raise the conveyer slightly so that he could remove the pins from the top ends of the support members. The victim removed the left pin, and then walked to the right side of the conveyor to remove the right side pin. The loader driver heard a pop and the conveyor jerked upwards. The victim was pinched between the conveyor drive motor and the crusher framework. The Mine Safety and Health Administration (MSHA) report of this incident concluded, "as the wheel loader attempted to lift the conveyor, tension energy was stored in the lifting cables. The lifting placed a tensile load on the support arm connection. This resulted in the tensile failure of one bolt, deformation of the plates and failure of the weld. The force applied by the wheel loader combined with the failure of the support arm caused the discharge conveyor to suddenly rotate upward."
Case 61	A 27-year-old male landscape supervisor was killed when the lowering arms of a skid-steer loader crushed his head and upper body. The victim and his crew were clearing the backyard and uprooting small diameter

	trees and tree stumps for a newly constructed house. The victim was operating a Case brand model 1845C skid-steer loader equipped with a 73-inch bucket to uproot small diameter (one to two inches) trees and tree stumps. To uproot the tree involved in this incident, he wrapped a 16-foot long, 3/8-inch binder chain around the base of the tree and wrapped the other end of the chain around the bucket's stabilizing bar. He placed the skid steer in reverse. As he was backing up, he raised the bucket to lift the tree roots from the ground. After removing the tree and with the bucket in the air, he raised the skid steer's safety bar and exited the cab. Standing on the ground under the raised bucket, he attempted to unwrap the chain from the tree. He was unable to remove the chain because of the tension on the chain caused by the raised bucket. He reached into the cab, lowered the safety bar, and began to operate the controls to lower the bucket. As the bucket lowered, he was unable to remove himself from beneath the raised arms of the skid steer and he was crushed between the skid-steer loader's arms and frame. A fellow worker heard a sound, turned around and saw the victim. He notified another worker, who ran to the residence where the crew was working. The homeowner called 911. His fellow workers raised the skid-steer loader arms and began CPR. Emergency response arrived and pronounced the victim dead at the scene. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI066.
Case 62	A 49-year-old male dragline operator died when his Bucyrus Erie 38B crane rolled into a 20-foot deep, water-filled pit. The victim had over four years experience mining at this pit but had only operated the Bucyrus Erie 38B crane for about five weeks prior to the event. The dragline controls provided for travel or swing with a single lever. The victim moved the dragline to within eight feet of the water's edge, the normal position for digging. The ground sloped at about 6% toward the pit edge. After stopping the dragline, he moved the swing/travel lever from the travel mode to the swing mode. With the tracks of the dragline pointing toward the water, the victim began to swing the boom, bucket, and the cab to begin digging. The track brake on the crane dragline had not been locked in the "on" position. The movement of the 75-foot boom and 1½-yard bucket provided forward momentum, and in combination with the slight grade toward the water and the unlocked track brakes, allowed the dragline crane to roll toward the water. The tracks tipped up and the boom moved down, then up, and then down again. The cab was angled slightly to the direction of the tracks, placing the cab over the right track. The victim attempted to jump from the cab as it rolled into the water, but his left leg became caught in the crawler and drive sprocket of the right track. The victim was pinned under the track at the bottom of the water pit.
Case 63	A 46-year-old male foreman was killed while preparing a silo for

	demolition. The victim entered the 20-foot diameter by 80-foot high silo through a 20- by 30-inch opening. He had a light, extension cord, and shovel with him. The 10-foot sweep auger was running. It was a common work practice to enter the silo with the sweep auger running. The silage remaining in the silo was approximately two feet high and covered the floor of the silo. It appeared he entered the silo to clean out the remaining grain material so the work crew could install jacks to raise the silo to remove the bottom piece of the silo. A caretaker for the property spoke with the victim before he entered the silo, and then left. When the caretaker returned, he went to the silo to check out what was going on within the silo and found the victim lying on the floor. The caretaker ran to the crew who were working at another silo and told them their boss was "down" in the silo. The crew ran to the silo and one of the crewmembers unplugged the sweep auger power cord and went in the silo to try to help the victim. The caretaker had already turned the power off. When the coworker entered the silo, the caretaker called 911. Crewmembers removed an 8-foot long by 30-inch wide section of the silo to allow for the fire department to remove the victim's body. The victim was pronounced dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 74.
Case 64	A 53-year-old male brakeman died when he was crushed between a gate and train track mobile engine while moving rail cars. The shipping yard had two hinged 20-foot long gates constructed of cyclone fencing that were used by the employer to seal off access to their property from a wooded area where three railroad track spurs entered the facility. The gates were to be held open by dropping the gate pin into a cinder block. The ground was higher on the side of the gate involved in this incident so the gate pin was in the gravel instead of the cinder block. The gate weighed approximately 400 pounds. Railcars are moved by a trackmobile, which is similar to a small train engine. The victim and his coworkers had completed moving six or seven railcars using a rented trackmobile; the company's trackmobile unit was being serviced. The rental unit was not equipped with side mirrors as was the company's unit. The victim opened a switch track to allow the trackmobile operator to travel to the railcar to be moved to outside of the gates. It appears that the victim boarded the side of the last railcar to ride it out of the area without being seen or informing his coworkers that he was taking this action. As the trackmobile operator approached the gates it appears that the wind, which was blowing at 28 knots, moved the gate up to the track. The gate movement was unseen by the trackmobile operator and apparently, the victim. The gate struck the trackmobile. The operator applied the brakes but before the trackmobile stopped, the gate became lodged onto the front of the trackmobile and bent the first 12-foot section of the 20-foot long gate so that it was up against the railcars as

	they traveled past. It is unknown where the victim was positioned, only that he was caught between the gate and the railcar. The trackmobile operator exited the operator's station and saw the victim on the ground between the gate and the side of the rail car. The victim was wearing an orange reflective vest. The victim was pronounced dead on the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 66.
Case 65	A 40-year-old male died while cutting a hay field for forage. He had attached a New Holland chopper to the rear of a Farmall 400 tractor and a forage wagon to the chopper to hold the cut hay. It is unknown how he came into the position of being run over by the tractor's rear wheel and the chopper. The victim was on his third pass in the middle of the field when he either fell from the tractor or was run over by it while standing on the ground. After the victim was run over by the equipment, the tractor continued to travel forward in the field in an arc from east to west, finally coming to rest in a tree line adjacent to the hay field. When the victim did not return home, family members went to search for him. They found him in the field and called for emergency response. Emergency Response pronounced the victim dead at the scene. Family members noted that all prior forage cuts the victim made were straight, except in the location just before where the victim was found. Family members noticed a very slight "zigzag," from west to east in this final cut. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI093.
Case 66	A 78-year-old male farmer was severely injured when he was run over by the rear wheel of his 1960s vintage model 1650 Oliver tractor. The victim had hooked up a 150-gallon pull-type boom sprayer so he could eradicate weeds near his 60-acre soybean field. After dismounting from the tractor and mixing the solution in the sprayer, he attempted to start the tractor while standing on the ground. Unbeknownst to him, the tractor was in forward gear. When he started the tractor, the tractor moved forward. He was unable to move out of the way of the rear tire and the tire ran over him. The tractor continued its forward movement and entered the second bay of a lean-to barn and was stopped by the side of the barn where the engine eventually stalled out. His wife found him lying on the ground approximately 45 minutes later. Upon finding him, the wife returned to the house and called 911. When she returned to him, he was conscious and spoke to her, stating that he had been run over by the rear tire of the tractor. Emergency Response arrived and stabilized him at the scene. He was taken to the local hospital and died approximately three weeks later as a result of the injuries sustained at the time of the incident. The MIFACE investigation report of this

	incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI108.
Case 67	A 49-year-old male agricultural laborer died while working in a 30-foot diameter metal grain bin with the 15-foot sweep auger running. The victim was working with another company employee in the grain bin cleaning the remaining corn from the bin using a flat plastic shovel. This bin was a newer bin and auger system; the victim may have been somewhat unfamiliar with the operation of this system. After working approximately 15 minutes, his coworker exited the bin while the victim remained inside to complete the task. No employee was stationed outside the bin to observe and communicate with the victim. Several hours later, another employee who was working on another task outside noticed that the auger conveyors for unloading the bins were running without moving grain. This employee proceeded to check the bins and found that the auger for the bin where the victim was working was not running. He entered the bin to see if anyone was inside. There were two piles of corn; one was approximately 6 feet high by 8 feet wide and the pile on the opposite side of the bin was approximately 10 feet high by 3 feet wide. He found the victim after walking around the 6-foot pile of corn. The victim was lying on the floor in front of the sweep auger with his right arm entangled in the equipment. His coworker exited the bin, went to the power disconnects outside the bin, and de-energized all power to all of the augers and called for emergency services. Emergency response arrived and the victim was pronounced dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 67.
Case 68	A 49-year-old male job setter was struck and run over by a powered industrial truck in the yard of an automobile engine manufacturing plant at approximately 9:00 p.m. He was on his break and had walked outside the plant to call his wife. He was talking to her on the phone when the powered industrial truck struck him. According to his wife, he mentioned to her that it would be difficult for him to hear her for a moment, because a hi-lo was approaching. She was listening as he was struck, dragged, and found unconscious. The truck that struck him, a Hyster Model S155XL, had just exited the plant and was transporting a chip hopper measuring 86½ inches wide, 66 inches deep, and 47 inches high across the blacktop-surfaced yard to the chip hopper building. The powered industrial truck operator had a valid permit to drive the truck. The illumination of the yard was adequate. The two lights mounted on mast of the truck provided no additional illumination for its path, because one was inoperative and the other was misaligned. He was pronounced dead at the site of multiple injuries. The summary and MIOSHA citations issued to the employer can be found at the MSU

	OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 90.
Case 69	A 68-year-old male farmer was killed when the tractor he was operating overturned after running over a 2-foot high by 6-inch diameter tree stump completely concealed by overgrown brush. The victim was mowing the edge of one of his bean fields pulling a brush hog with his Farmall Super M tractor. The tree stump was completely concealed by overgrown brush. It appears that the tractor's left rear wheel ran over the stump causing the tractor to roll to its right. The victim was pinned between the steering wheel, tractor seat, and the ground. The tractor was not equipped with a rollover protective structure.
Case 70	A 66-year-old male was killed when he was run over by a tractor that was traveling in reverse. The victim was assisting in the corn harvest. He sat in the cab with the driver of a self-propelled corn chopper harvesting corn. The gravity box attached to the corn chopper was full and needed to be changed out. The driver of the chopper radioed for an empty gravity box to be brought out to the chopper. A tractor was used to bring the empty gravity box to the location of the chopper in the field. When the tractor pulled up alongside the chopper, it was too far forward. The victim, after exiting the cab of the corn chopper, unhooked the full gravity box from the chopper, then walked over to the tractor's empty gravity box to unhook it. The driver of the chopper radioed the tractor driver to move the gravity box back towards the chopper. The tractor driver placed the tractor in reverse and began to move. Unbeknownst to either driver, the victim was near the tractor and was run over by the tractor's rear wheel.
Case 71	A 34-year-old male construction worker was killed when the tractor he was operating overturned into a culvert and pinned him under the tractor seat. The victim was working with a friend on his farm cutting firewood. The victim was driving an Allis Chalmers model D-17 tractor that was hauling an "easy dumper" 20-foot long wagon heavily loaded with wood through one of his friend's fields. A dry, two-track type trail connected the field he had traveled through to another field. This trail had a downhill run before going uphill again. Adjacent to the trail was a 10-12 foot ravine that flattened at its base. The ravine slope was approximately 30-45 degrees. It appeared that the trailer slipped off of the edge of the ravine and pulled the tractor down with it. The tractor rolled end over end. The victim was thrown from the tractor and landed in the bottom of the ravine. The tractor came to rest on the victim and pinned the victim under the tractor's seat. The tractor was not equipped with a ROPS.
Case 72	A 49-year-old male plumber was killed when he was crushed between a tractor and a backhoe as he was assisting in the opening of a septic system. The victim was operating a backhoe and was trying to hook the backhoe to the rear of the tractor operated by his friend. They were having difficulty aligning the mounting pins. The rear of the two

	vehicles faced each other, so in order to see the mounting pins, the two individuals had to look over their shoulders. A new hitch had been installed on the tractor, and this was the first time the tractor operator had attempted to hook up anything. Unbeknownst to the tractor driver, the victim dismounted from the backhoe while the tractor operator continued to attempt to hook up the tractor. The victim was crushed between the tractor and the backhoe. Toxicology results showed that the victim had a blood alcohol level of 0.367%.
Case 73	A 46-year-old railroad worker (switchman) was killed when he was pinned between an engine's plow blade and a rail car. The victim and his coworker (engine man) were in the process of lining up rail cars. The victim's job was to uncouple the cars. To uncouple the cars, the victim asked the engine man to stop movement. When the train engine pushed the train cars back onto a siding, it created slack in the coupling mechanism. When the engine stopped, the cars took up the slack and moved away from the engine providing room between the engine and the car. This movement allowed the victim to go between the engine and the car and turn the angle cock, which closed the valve for the air brakes. Using a lever, he uncoupled the train cars, and then told the engine man to pull back. The engine was equipped with a plow blade, which reduced the room for the victim to reach in and do the necessary work. The incident occurred on the inside curve of a sharp turn in the tracks. This curve in the track also forced the plow to be even closer to the rail car than it would have been on a straight track. The victim had radioed the engine man to stop the engine movement. When the engine man did not hear a request from the victim to pull back, he exited the engine to check on the victim. The engine man found the victim's body pinned at chest height between the engine and an empty car. According to the police report, "With the combination of the curved track and the plow on the engine, it appears that there was not enough room for the victim to reach in and perform the necessary functions. It is possible that the cars rebounded and came back towards the engine, pinning the victim between the engine snow plow and the car's end walkway."
Case 74	A 50-year-old male chainsaw operator for a tree service died when he was pinned between a tree and the tire of a Hydro Ax. The victim was a member of a three-person crew assigned to clear brush from a natural gas pipeline. The victim had cut a notch in a tree that was going to be felled, and then began to initiate a back cut on the tree. His coworker was operating a Hydro Ax Model 721E that was equipped with a rotary blade attachment. The operator had not been trained to operate this equipment, nor was verification made or testing performed to ensure operator capability to operate this equipment. The Hydro Ax operator thought that the tree was going to fall into overhead power lines. The Hydro Ax operator raised the rotary attachment approximately 13 feet from the ground and drove into the tree to push the tree in a direction away from the power lines. The operator stated that he was not paying

	attention to the location of the victim. He was looking at the tree and his primary concern was to ensure the tree did not fall into the power line. The operator had a clear field of vision while operating the Hydro Ax. The victim was caught between the tree and the tire of the Hydro Ax. A site survey performed by MIOSHA revealed that the tree was properly notched and back cut to fall in a direction away from the power line. The victim was pronounced dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 81.
Case 75	A 53-year-old male was killed when the mast of a pick and place unit he was repairing slipped from the fabric web sling that was supporting its weight and crushed him. The victim and a coworker were attempting to remove a jammed machine component called a lift block from under the pick and place unit. The problem was in an area where a yolk was attached to the bottom of the mast. In order to view and reach the affected area, he had lifted out a 16-inch wide by 21-inch high section of grated platform and had scooted on his back underneath the pick and place unit. He was having difficulty freeing the part he wanted to move. He and his partner decided to raise and lower the mast manually to loosen the part, but the unit was equipped with a safety support bar that prevented the mast from being lowered beyond a given level. They removed the safety bar so that the mast could be lowered beyond the safety support bar stop position. They placed a fabric web sling on a 2-inch protrusion on the mast, which they attached to an overhead chain fall in order to raise and lower the mast with the manual chain hoist system. Apparently the victim's partner had raised and lowered it once upon the victim's instruction when he realized it felt too light. The fabric web sling had slipped from the mast protrusion causing the equipment to fall and crush the victim's head. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 89.
Case 76	A 6-year-old male youth was killed after being run over by a skid-steer loader driven by his 9-year-old brother while working on the family farm feeding cattle. The victim and his brother and sister were responsible for feeding the cows. Normally, this chore was done earlier in the evening; on this day, it was done in the later evening when it was dark outside. The victim's 9-year-old brother was operating a John Deere skid-steer loader, Model 6675 carrying silage to the cows. The victim and his sister ran ahead and opened the gate to the pen to allow their brother to unload the silage. Both the victim and his sister ran down a two-track path from the barn to the pen; the victim's brother used the same path to get to the pen. One side of the path was kept mowed; the other side of the path was left unmowed and was overgrown. External lighting did not light the path or pen area. The

	victim and his sister's responsibility were to watch the gate so that the cows did not escape. The victim's brother unloaded the silage. As he was exiting the pen, he leveled the dirt by backblading. After exiting the gate, the victim's brother turned the skid-steer and proceeded to drive up the path towards the house. As his sister was closing the gate, the victim ran after his brother because he didn't stop and wait for him and his sister. His brother would normally carry his brother and sister back to the house in the skid steer bucket. The victim's brother stopped the skid-steer and began to back up and turn around when he felt a bump. He felt a second bump and looked to see what the bump was. It appears that when the skid-steer stopped and began to turn, the machine knocked the victim down and the skid-steer tires ran over him. The lights of the skid-steer illuminated the ground and he saw his brother lying there. The victim's brother stopped the skid-steer and checked on his brother. Seeing his condition, he and his sister ran to the house for help. Emergency response was called and the victim was pronounced dead at the scene. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI176.
Case 77	A 23-year-old male mill hand died when a drill was thrown from a shattered hard steel tool extension and struck him in his chest. He was operating a high-speed computerized numerical control (CNC) machining center. The CNC programmer asked the victim to determine if a ¾-inch drill that was 10 inches in length "ran true". The drill's 3-inch long, ½-inch outside diameter (O.D.) tool was placed in a purchased 6-inch long, 1-inch O.D. hardened steel tool extension. The hardened steel tool extension was threaded onto an in-house manufactured soft steel tool extension that was 10 inches long and had a 1-inch O.D. Two inches of the soft steel tool extension was inside of the tool holder. The victim attached this tooling to the tool holder and pressed the "clamp" button on the computer console. The machine was operating in manual data input mode. The victim entered 3000 revolutions per minute (rpm) for the spindle rotation instead of entering 300 rpm. The machine doors were wide open and the machine was in override mode. The victim pressed the start button, and because the over ride was set 110%, almost instantaneously the machine reached 3300 rpm. The victim was standing near the open door looking at the spinning tooling that was in the "home" position. He nodded to the programmer and indicated that everything was working appropriately. His left side was facing the open machine doors as he turned to stop the spindle rotation at the control panel. At that moment, the soft steel tool extension bent approximately 90 degrees. As a result, the hardened steel tool extension struck a part of the automatic tool changer and the extension shattered. The drill was thrown from the hardened extension. Both the shattered extension pieces and drill struck the victim. The

	programmer hit the emergency stop button. A supervisor who heard the tool break went to the location and attempted first aid measures. Emergency response was called and the victim was taken to the hospital where he died. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI180.
Case 78	A 46-year-old male feed room operator was crushed between a storage rack and a forklift truck. The victim was the driver of the forklift truck that crushed him. Another employee who had entered the feed room discovered him. He was pinned at chest level between a 1,250 pound, 4- by 4-foot cardboard gondola that was on the raised forks of the truck and the shelving unit in front of it. The engine of the forklift was running. Another worker, responding the calls of the worker who had discovered the victim, backed the forklift up to free the victim. He indicated that the gear selector on the forklift was in the forward position and the parking brake was not set. As no one witnessed the actual incident, what happened prior to the victim's being crushed is conjecture. It is thought that the victim noticed something on the shelf where he meant to place the gondola and climbed from the forklift to remove it leaving the forklift running. Records indicated that the forklift was difficult to start. Apparently the forklift moved forward crushing him. He was taken to the hospital where he died three days later. The cause of death was reported as traumatic asphyxia with cerebral anoxia due to blunt impact of the chest. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 88.
Case 79	A 51-year-old male supervisor was working alone when he was killed after becoming entangled in a SpeedCo Model 65, 9-inch posthole auger attached to a John Deere 870 tractor. The tractor was equipped with an operator presence sensing system (seat safety switch) that was not working properly, but had the ability to be deactivated. As part of the deactivation device, the tractor could still be operated if the tractor operator was not sitting in the seat. The auger safety manual indicated that the posthole digger was designed to operate only from the tractor seat and that an operator should make certain that the tractor is shut off and the PTO drive is disengaged before leaving the tractor seat. It appears that while digging the last posthole, the victim's jacket caught on the rotating auger and wrapped around the auger. A coworker, who noticed the victim's vehicle still in the parking lot, searched for him. After finding him, his coworker called for emergency response and the victim was pronounced dead at the scene.
Case 80	A 49-year-old male truck driver was killed when the Allis Chalmers front-end loader he was operating rolled over into a ditch and pinned him. To provide a second income, the victim stored and sold junk

	vehicles. The victim was hauling junk cars from the back of his property to his residence. He was using the residence as a staging area for the vehicles until he could sell them at a recycling facility. The victim had chained the junk car to the front bucket of the front-end loader. He was dragging the car while he was traveling backwards on a gravel road. There was a swampy area on both sides of the road. There was a culvert and water lying in the ditch. It appears as though the front-end loader may have had a left rear tire drop off the edge of the roadway, causing the loader to overturn down the grade of the bank. This caused the victim to be thrown from the loader and the loader then landed on him.
Motor Vehicles (29)	
Case 81	A 54-year-old male mechanic was driving a pickup truck to retrieve needed parts for his employer, a county road commission. As he was driving westbound on a snow-covered, slippery, dark roadway he may have been distracted by drinking and/or pouring tea from a thermos. He lost control of the vehicle, left the roadway and went onto the shoulder. He continued another 100 feet where he struck and came to rest against two trees. He called his employer to let them know his vehicle had crashed. He was not wearing a seat belt/shoulder harness and was pinned in the vehicle. An airbag was present but did not deploy. He died three days later in the hospital from head injuries sustained in the incident.
Case 82	A 40-year-old male cement truck driver was struck and killed by a vehicle after he had parked his truck on the right shoulder of a freeway. He had called his boss stating that the brakes on the truck were overheating. The victim was standing approximately to four to five feet behind the driver's door next to the truck when a vehicle whose driver fell asleep drifted onto the shoulder and struck him. The victim was pronounced dead at the scene.
Case 83	A 36-year-old male police officer was killed while driving his vehicle to assist another officer. The two-lane roadway had a slight left hand curve or "jog" in the road. As his vehicle approached the slight left hand "jog" in the road, he failed to make the necessary steering adjustments and the right side tires left the road. He attempted to re-enter the road by steering left. He ran off the roadway to the left and became airborne as the vehicle crossed a large drainage ditch. The vehicle then crashed into the basement of a house and caught on fire. The officer died from inhalation of products of combustion. He was wearing a seat belt/shoulder harness and was pinned in the vehicle. The airbag deployed.
Case 84	A 36-year-old male police officer was the driver of a patrol car that was struck by an oncoming vehicle as he was transporting a prisoner back to the police station. The officer was crossing several lanes on a freeway to enter a median just after a slight rise in the road with his patrol lights flashing. A driver traveling at a high rate of speed and under the influence of alcohol struck the patrol car on the driver's side. The victim

	was not wearing a seat belt/shoulder harness and was pinned in the vehicle. The air bag deployed.
Case 85	A 37-year-old male truck driver was killed when he collided with the rear of another tractor-trailer. He was traveling eastbound and traffic was rolling to a stop due to road construction. A driver of a pickup truck saw the victim's truck approaching from the rear at a high rate of speed and that it was not going to be able to stop in time. Although the pickup truck driver took evasive action, the pickup was struck in the rear by the victim's truck. The pickup truck was propelled into the ditch, and the victim's truck continued on and struck a semi-truck's trailer. The victim was pinned in the crushed cab of his truck. He was initially able to talk with rescuers, but in the time it took for rescuers to free him from the cab, he expired. He was wearing a seat belt/shoulder harness. The vehicle was not equipped with an airbag.
Case 86	A 60-year-old male semi-truck driver was killed when he struck several light posts and overturned while hauling a load of molten aluminum on a flatbed. The semi-tractor trailer ran off the pavement to the victim's right, onto the gravel shoulder, and then into a ditch where the vehicle struck several light posts. The trailer overturned spilling molten aluminum. The vehicle caught fire and the victim was unable to exit the cab. It is unknown if he was wearing a seat belt/shoulder harness and if the vehicle was equipped with an airbag.
Case 87	A 57-year-old male veterinarian was killed when his vehicle struck a woodpile, rolled over, and then struck a tree. The victim was the driver of the vehicle and had arrived at a rural farm residence to deliver some drugs for the farm owner's cattle. After delivering the medicine, he attempted to leave by backing up a short distance. He was wearing large heavy rubber boots that extended to just below his knee. Police officers found that the victim's right foot was stuck underneath the brake pedal and against the gas pedal. According to witnesses, the motor was revving. It appears that the victim, after placing the vehicle in gear could not remove his foot from underneath the brake pedal. He placed the vehicle in neutral in an attempt to stop the vehicle's forward progress. He may have tried to apply the brakes, but with his foot jammed under the brake pedal, he was unable to fully apply the brake. The vehicle did a 180-degree spin and traveled in the opposite direction, crossed the road's centerline and struck a woodpile. The vehicle rolled over and struck a tree. The top of the vehicle on the driver's side was crushed down far enough to pin the victim's head against the headrest causing his neck to break. He was wearing a seatbelt/shoulder harness. The airbag did not deploy.
Case 88	A 39-year-old male design supervisor was killed when riding his motorcycle on a company errand. An oncoming vehicle that crossed the centerline struck him. The victim applied full brakes and tried to avoid the collision but was unsuccessful.
Case 89	A 42-year-old male corrections officer was killed when he was run over

	by a bus in the parking lot/driveway in front of the prison administration building while riding his motorcycle. The driveway formed a loop in front of the administration building. He was driving his motorcycle southbound down the wrong way on a one-way drive at a rate higher than the posted speed limit of the driveway. The bus was traveling slowly and in the proper direction of travel. The prison parking lot was full, making visibility of other traffic difficult. The victim, upon seeing the bus, applied the motorcycle brakes hard which caused them to lock up. This caused the motorcycle to skid, and then the motorcycle slid on its side on the ground. The victim became separated from the motorcycle as it neared the bus. Both the motorcycle and the victim slid under the bus. The victim was run over by the passenger side rear tires of the bus.
Case 90	A 49-year-old male parts salesman was killed after being struck by an airborne car (vehicle #1) while he was traveling. The victim was driving vehicle #3 and was struck by vehicle #1. The driver of vehicle #1 was traveling at an excessive speed and ran a red light. Vehicle #1 struck vehicle #2 shearing off vehicle #2's front end and sending vehicle #2 spinning onto a sidewalk. Vehicle #3 continued down the same sidewalk, where it struck a pillar support. This caused vehicle #1 to become airborne. Vehicle #1 landed in the windshield area of vehicle #3. It is unknown if the victim was wearing a seat belt/shoulder harness. He was pinned in the vehicle. The airbag deployed.
Case 91	A 31-year-old male hospital courier was killed when the van he was driving hit a tree after he swerved to avoid hitting an individual on a riding lawnmower that had crossed the road's centerline. The driver of the lawnmower had completed a pass in the front yard and was in the street turning the lawnmower around to re-enter the yard. The victim swerved to the right to avoid the mower, overcorrected, crossed the centerline, and ultimately lost control of the van. The van flipped on its side and went into a ditch, then hit a culvert and went airborne into a tree. The victim was wearing a seat belt/shoulder harness and was pinned in the vehicle. The airbag did not deploy.
Case 92	A 40-year-old male engineering technician was struck and killed on a road-building project by a cement mixer that was traveling in reverse. The road surface was compacted aggregate and crushed limestone and had a slight incline. There were two cement mixers in the immediate vicinity. Cement mixer #1 was unloading cement into a curb-paving machine ("mule"). Cement mixer #2 had already completed unloading its cement into the mule and was being washed out by the driver. To determine if the mixer #1's concrete was within specifications, the victim took a sample that weighed approximately 600 pounds from chute and loaded the concrete into a wheelbarrow. The victim pushed the wheelbarrow past the driver side of mixer #1, and as he came to the rear of mixer #2, he turned sharply south, to his right to get to his truck. The victim's back was facing mixer #2. At approximately the same

	time, the driver of mixer #2 finished washing out his mixer, entered the cab, activated his backup alarms and began to move in reverse to leave the job site. It appears that the victim heard the backup alarm from mixer #2 because a witness stated that he increased his pace to attempt to get out of the way of the mixer. It appears that the victim either tripped or lost control of the wheelbarrow and was struck and backed over by mixer #2. The victim was transported to a local hospital where he was declared dead. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI107.
Case 93	A 54-year-old male truck driver was killed when the produce truck he was driving rolled over and he was trapped inside of the cab. The incident occurred in a two-way traffic construction zone; the speed limit was 45 mph. The victim's truck, traveling northbound, crossed the centerline of the two-lane asphalt road. He entered the southbound lane's dirt shoulder and apparently tried to swerve back into the southbound lane when the truck rolled over and landed on its roof. The victim was pinned against the steering wheel by the backside of the cab. He was not wearing a seat belt/shoulder harness. The airbag did not deploy.
Case 94	A 61-year-old male inspector died when he was run over by large off-road dump truck within a roadway construction area closed to traffic. The Bell B30B 6x6 articulated dump truck that struck him was equipped with appropriately sized and correctly mounted side view mirrors. The truck was also equipped a manually actuated back up alarm, that upon inspection, sounded within approximately five feet of its parked location when the dump truck backed up. The construction area was being milled at the time of the incident. The victim was marking a 4-foot path of travel for the milling machine on the pavement with spray paint. The driver of the off-road dump truck was backing up to the milling machine and stated he made eye contact with the victim as he was backing up. While still backing up, the driver looked out of his left mirror and could not see the victim so he slowed down. The victim walked behind the moving off-road dump truck and began to mark the road with his back facing the dump truck. The driver of another vehicle saw the victim in the path of the backing dump truck. Seeing that the truck was going to hit the victim, he sounded his air horn to warn the victim and the driver of the truck. Upon hearing the air horn, the truck driver looked out of his right mirror and saw a hard hat on the ground. He stopped his truck and looked out the right cab window. He saw the victim lying between the front and rear tires. It appears that the victim was bent over when the truck struck him. The victim was wearing a hard had and yellow safety vest. Emergency personnel took the victim to the hospital where he was later pronounced dead. The summary and MIOSHA citations issued to the employer can

	be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 64.
Case 95	A 60-year-old male farmer was killed when he was thrown from the tractor he was driving when the tractor was struck by another vehicle. The tractor had a blade attached to its rear. The victim was driving the tractor on a two-lane, unlit asphalt road in the evening. A car heading in the same direction came up upon the tractor and struck the tractor's rear blade. The impact caused the blade to disconnect and the victim to be thrown from the tractor seat. He struck his head on the road. During the accident reconstruction activity, the responding police turned on the tractor's lighting system and found that the tractor had operational headlights. The rear utility flood lamp was directed downward to illuminate the blade implement area. One of the two red lenses at the rear of the tractor was broken, showing a white light to the rear. These lamps operated sporadically, flashing very quickly with lengthy pauses between flashes. The tractor was equipped with a slow moving vehicle emblem. The tractor was not equipped with a rollover protection system and/or seatbelts.
Case 96	A 43-year-old male sheriff deputy was killed when the patrol car in which he was a passenger in left the roadway and rolled over twice. The victim was traveling with another officer to the scene of an accident on a wet, two-lane road that had a speed limit of 45 mph. The roadway direction was north south, but at the crash area, the road curved to the east, then curved to the west, then continued in a straight line. Streetlights were positioned prior to and after the curves in the road; the area of the curves did not have lights. Due to the positioning of streetlights, when approaching the curves, the police report indicated that an illusion was created that the road was straight. The driver was operating the vehicle at an excessive speed for the surface conditions, and thus could not negotiate the curves, which caused the vehicle to leave the roadway and roll over twice. The two occupants were not wearing seat belts/shoulder harnesses. The victim was thrown from the vehicle. The airbag did not deploy.
Case 97	A 50-year-old male postal carrier was killed while delivering mail. The victim was driving a postal vehicle equipped with an operational flashing yellow indicator light. The vehicle was rear-ended by a semi-truck while the victim was slowing down to deliver mail at a mailbox. The driver of the semi was reaching down to get his cell phone and did not observe the postal vehicle's left rear corner partially in the road. The driver of the semi attempted to swerve to avoid hitting the postal vehicle but was unsuccessful. The semi driver stated in the police report that he had previously received an injury to his left eye and that he needs to wear glasses so that he is not totally blind in that eye. He stated that he was wearing the glasses at the time of the collision. The semi-truck driver also stated that he had problems with depth perception due to the

	eye injury. The victim was not wearing a seat belt/shoulder harness and was thrown from the vehicle. The vehicle was not equipped with an airbag.
Case 98 Case 99	A 24-year-old male electrician and a 26-year-old male electrician were killed after their pickup truck (vehicle #1) was struck on the driver's side by a van (vehicle #2). Vehicle #1 was traveling at normal highway speed in the right lane on the expressway. It appears that vehicle #2 came from the left expressway lane and struck the pickup on the driver's side at the rear of the driver's side door, causing the pickup to leave the roadway, strike a sign, and roll down a 15-foot embankment. Both the driver and passenger were thrown from the vehicle. The pickup landed on them, pinning them underneath the pickup's passenger side. The two occupants were not wearing a seatbelts/shoulder harnesses. The airbags did not deploy.
Case 100	A 59-year-old male semi-truck driver was killed when his vehicle struck a bridge support pillar. There was construction in the left lane and the normally three-lane road was down to two lanes. The road was icy. The victim was driving his semi-truck in the left lane. A pickup truck was in the right lane. The pickup was traveling at 65 mph in a 50 mph zone. The pickup was attempting to pass the semi when the pickup began to fishtail. The pickup truck struck the semi twice, then struck the median wall. The semi struck a bridge support pillar. The victim was not wearing a seat belt/shoulder harness. On impact with the pillar, he was thrown from his cab. The cab was not equipped with an airbag.
Case 101	A 50-year-old male system engineer was returning to work when he exited onto the service drive, crossed the drive and crashed into a utility pole. It is unknown if he was wearing a seat belt/shoulder harness. The airbag deployed. It is unknown if he was pinned or ejected from the vehicle.
Case 102	A 42-year-old male pharmaceutical representative was driving a vehicle on the expressway. Traffic was merging and slowing down due to a lane closure. A semi-truck struck the victim's vehicle in the rear. He was wearing his seat belt/shoulder harness and was pinned in the vehicle. The air bag deployed.
Case 103	A 53-year-old male was a passenger in a car whose driver (vehicle #1) was driving east on a two-lane road. The driver lost control of the vehicle, entered the shoulder, then overcorrected causing the vehicle to cross the centerline and enter into oncoming traffic. Vehicle #1 was hit on the passenger side by vehicle #2 on the paved shoulder of the westbound lane. He was wearing a seat belt/shoulder harness and was pinned in the vehicle. The airbags deployed.
Case 104 Case 105	A 24-year-old male driver and his 26-year-old male passenger were killed when their pickup truck struck another vehicle in the rear. It was unknown if the victims were wearing seat belts and shoulder harnesses. Both victims were pinned in the vehicle. The airbags deployed.
Case 106	A 25-year-old male truck driver was killed when his semi-truck he was

	driving rear-ended the trailer of another semi-truck. The semi-truck the victim was driving was carrying two large steel stamping dies and four check gauges. Traffic ahead was trying to merge to the right due to a lane closure for an upcoming construction zone. The victim did not attempt to slow down or stop. The excessive impact forces from the collision caused the dies and check gauges to break free. The crash guard on the victim's flatbed trailer was torn free. The die closest to the cab was still attached to the crash guard and was found some distance away from the cab. The rearward die was found on the roadway adjacent to the cab; this die appears to have struck the victim, causing his death. It was unknown what caused the driver to take his attention away from driving and not see traffic stopped ahead. According to the police report, the semi the victim collided with had his four-way hazard flashers on, but a vehicle that moved from behind the trailer when it appeared that the victim was not slowing down could have obstructed the flashers. The victim was declared dead at the scene. He was wearing a seat belt/shoulder harness. The vehicle was not equipped with an airbag.
Case 107	A 26-year-old male semi-truck driver was killed when he was traveling too fast for the conditions on a roadway that was wet and slippery due to heavy rains. The driver lost control of the vehicle where the road was on a decline and where the roadway makes a curve to the left. Due to his speed, the victim was unable to negotiate the curve, exited the roadway to the right, struck a bridge-rail/wall, and then rode up along the wall. The impact with the wall caused the tractor to "jack-knife" to the right as the vehicle continued along the wall. The cab portion struck a light pole. He was not wearing a seat belt/shoulder harness and was ejected from the vehicle. The vehicle was not equipped with an airbag.
Case 108	A 70-year-old male truck driver was driving a delivery type "box" truck on a three-lane city street. He was swerving lane to lane. He struck a curb, then lost control of his vehicle, and crossed through three lanes of traffic. He than ran off the roadway, struck three road signs and came to rest against a concrete planter in front of a building. He was wearing a seat belt/shoulder harness and was pinned in the vehicle. The airbags did not deploy.
Case 109	A 62-year-old male semi-truck driver was killed when the semi he was driving (Vehicle #1) rear-ended a semi-truck trailer (Vehicle #2). Vehicle #2 was traveling at a slow rate of speed in the right-hand lane with his hazard lights on due to construction and an earlier accident. The victim approached Vehicle #2 at a high rate of speed and struck the trailer of Vehicle #2 at the rear right corner. He was wearing a seat belt/shoulder harness and was pinned in the vehicle. The vehicle was not equipped with an airbag.
Struck By (13)	
Case 110	A 23-year-old male died at a concrete prefabricating facility when he was struck in the head with a 10-inch PCE concrete extruder weighing

	approximately 9000 pounds. A 20-ton, cab-operated overhead crane was moving the extruder. The remote control for the crane was not functioning properly, so a crane operator was in the cab. The PCE extruder had made its final pour and needed to be washed and cleaned. The supervisor asked the crane operator to move the PCE to the staging area platform rack that was 44 inches above the ground. The victim, whose job classification was "yardman," entered the building at the end of his shift. The crane operator asked the victim to help "spot" the PCE on the staging platform rack. The victim walked up the stairs to the platform and positioned himself on the northeast corner of the platform. The crane operator hoisted the unit up to the platform. Another employee noticed that there wasn't anyone to "spot" the unit on the backside so he ascended the stairs and positioned himself on the southwest corner of the platform to guide the rear of the unit. The coworker signaled to the crane operator to move the PCE unit to the west. The crane operator accidentally moved the hoisted PCE unit to the east. The victim attempted to get out of the way of the machine being moved but was unable to do so. His head was caught between the moving PCE unit and another PCE unit on the staging platform approximately 35 inches east of the moving unit. The victim came down from the platform and sat down. Emergency response was called and a coworker attempted first aid. The victim soon became unconscious and was later pronounced dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 91.
Case 111	A 67-year-old male farmer was killed when he was pinned under a piece of hardened lime that had broken free from the top of a bunk silo. The victim was filling feedbags with silage from the silo. The pile of silage was at least 20 feet high and on top of it was a large piece of black plastic, which covered the silage to keep it dry. Lime that had hardened was placed on the plastic to keep the plastic from blowing off the pile. The victim was struck by an oval, 4- by 3- by 1-foot piece of hardened lime with silage frozen to it that fell from the top of the silage pile. The piece was very heavy; it took about five firemen to lift it from the victim. The victim was pronounced dead at the scene.
Case 112	A 69-year-old male truck driver was crushed and killed when a bundle of steel rods from the load of eight bundles he was delivering to a manufacturing facility fell onto him. He was in the truck well at the loading dock removing the tarp and load binders that secured the load to the truck bed. He had loaded and secured the load on a flat bed trailer himself earlier (unsure if that day) and driven it to the site. He had covered the load with a tarp to protect it from rain. Apparently during transportation of the load, it shifted. He was unable to see that the load had shifted because of the tarp covering the load. When the bundle of rods fell from the truck bed, it pinned him between the bundle and the

	side of the truck well wall. The cause of death was asphyxiation. Toxicology tests were negative. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 56.
Case 113	A 39-year-old male truck driver was killed after being struck by a hose under pressure that came loose during a leak test of a tanker. The victim was preparing to unload a 6600-gallon tanker of 80% methyl mercaptan and 20% dimethyl sulfide, which are used to odorize natural gas. In preparing to unload, he conducted a leak test. To conduct the leak test, the victim hooked up a 20-foot long hose to a nitrogen cylinder and the tanker manifold system to pressurize the tanker's vapor line. The male and female cam lock fittings used at the nitrogen end of the hose and the manifold hook up end of the hose were forged brass ¾-inch ID fittings. The hose was rated at 1250 psi, and the cam lock fittings were rated at 350 psi. It appeared that the hose had been hooked at one end with a female cam lock fitting to the nitrogen cylinder and the other end of the hose was hooked with a ¾-inch ID male cam lock fitting to a vaporline ¾-inch female fitting mounted on the tanker's manifold system. It appeared that the vapor line valve on the tanker was not opened at the time of the incident. The piping coming from the gauge/regulator to the tanker was not hooked to the port on the regulator where the nitrogen pressure could be regulated. When the nitrogen bottle valve was turned on it allowed the full pressure of approximately 2500 pounds of nitrogen to flow through the 1250 psi rated hose into the 350 psi rated cam lock fitting used to hook to the tanker piping. As the 2500-psi flow of nitrogen reached the cam lock fitting, the pressure caused the hose end and fitting to come off the tanker. The cam-locking device came loose causing the hose end to whip through the air with great force and struck the victim in the abdomen, causing severe injuries and ultimately his death. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 57.
Case 114	A 49-year-old female certified member of a ski patrol was killed when she struck a 14-inch diameter tree while skiing down an "intermediate" level run. Near the end of the run where it flattened out, her estimated rate of speed was 25 mph. It appeared that she had caught an edge and could not get off it. This caused her to veer into the woods on the right side of the run and eventually strike the tree. She died of head and neck injuries. She also had a heart attack.
Case 115	A 62-year-old male millwright was killed while assisting in the movement of a die. A bridge crane was lifting the die. The lift stopped (reason unknown) when the die was about six feet off the ground. Two employees (millwright and electrician) went onto the bridge crane with the remote control for the crane. There was no operator in the cab as the

	crane was run from the ground. The gearbox cover was removed and a broken gear tooth was discovered. The millwright apparently attempted to jog the crane to free the lodged tooth. At this point there was a catastrophic failure of the gearbox or motor, described by witnesses as an explosion. The millwright was stuck in the head by debris. Simultaneously, the 40-ton load fell to the ground, and the inertia in the hoisting mechanism caused the wire rope to "flail" and caught the victim in the process. The electrician was unhurt, and no one was under the die when it fell.
Case 116	An 81-year-old male farmer was killed when one of the utility poles he was moving with his tractor fell onto him. The tractor was equipped with a front-end loader bucket. He loaded the poles into the bucket and during transport it appears that a utility pole rolled off the loader bucket and onto the chest of the victim. When he was found in the field, the tractor bucket was raised to its maximum height and the victim was in the seat with both feet on the pedals on each side of the tractor. There were visible drag marks from the pole in the field soil. The victim was leaning towards the right tractor fender with the large end of the pole on top of his chest. Toxicology results indicated that he had 0.09% blood alcohol level.
Case 117	An 18-year-old male construction worker was killed when a steel roof truss that was standing vertically on "relatively flat" stabilized gravel tipped over onto the midsection of his body. It was his second day on the jobsite. The beam he was working with weighed approximately 2250 pounds and was 50 feet long by 5 feet high by 9¼ inches wide. A coworker was using a rough terrain forklift to set the beam in a vertical position. No bracing or support system was used to keep the beam from falling. The job foreman demonstrated to the victim how to plumb column steel and told him to get out of the way if a girder starts to fall. The crane operator lowered the ball and hook, and the victim removed two web slings from the hook and then raised the ball out of the way. The victim threw one sling over the top of the girder. While placing the second sling, the girder to began to wiggle and it started to fall. The victim didn't or couldn't get out of the way and the girder fell onto him, pinning him. The victim had been employed by this company for two weeks and was not a trained or qualified rigger. Emergency personnel transported the victim to a local hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 82.
Case 118	A 73-year-old male construction laborer was killed when a concrete masonry wall collapsed onto him. He and a coworker were cleaning the inside of a newly constructed concrete masonry wall under the porch at a residence. The work area was dark. Both employees had lights. The concrete block wall had been laid during the past three to five days. On

	the first day, they laid a couple rows of blocks, the next day they laid all but the top couple of rows. The day before the incident, they laid the last couple of rows on the top of the wall. On the day of the incident, three other company employees were working outside of the wall and were using a skid steer loader to backfill the excavation with sand. It appears that the sand backfill was approximately four to five feet high on the concrete block. The block wall collapsed onto the victim and his coworker cleaning the wall. The sand was being dumped into the excavation instead of placing it in lifts and compacting it. The 2003 Michigan residential code R404.1.7 states that backfill shall not be placed against the wall until the wall has sufficient strength and has been anchored to the floor above or has been sufficiently braced to prevent damage by the backfill. Emergency response was called and the victim was pronounced dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 68.
Case 119	A 44-year-old male laborer was killed when the scaffold platform he was working from fell, and the 183-pound hoist motor, which he had been using to raise and lower a corner of the platform, fell on him. Four workers were standing at the four corners of a Beeche (40-foot by 32-foot) scaffold platform lowering it to the ground from under a bridge where they had been working. Each worker controlled a separate motor. Each of the cables was fed through an electric (cable climbing-type) hoist motor that was attached by chains and shackles to the platform. The upper ends of the cables supporting the platform were attached to u-shaped 3-inch angle iron brackets that were hooked over the bridge abutment, two on either side of the bridge. One 8-inch wide bracket fit the abutment snugly. The other three brackets were 13 inches wide at the top and rested on the abutment at an angle. These brackets were shop-built and lacked required design, testing, or certification for their ability to safely support the intended loads. The workers, standing on the platform, were releasing the platform from where it had been attached with hooks to beams under the bridge. They were wearing body harnesses but none were tied off. They were attempting to let the platform down by simultaneously operating the four separate hoist motors. The actual lowering procedure was not synchronized between the men. This uneven release caused the platform to tilt toward the victim's corner. The inner braces of all four angle iron brackets hooked over the bridge abutment spread open causing the platform to fall. The order in which the brackets failed is not known. In addition, holes through which the cables were secured on two of the brackets were torn open. The four workers on the platform fell approximately 20 feet to the ground. Three workers survived the fall, but the hoist motor the victim was controlling to lower his corner of the platform fell onto him causing him to be crushed to death. The summary and MIOSHA citations issued

	to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 78.
Case 120	A 22-year-old male carpenter died when the walls of an 8-foot excavation he was working in collapsed and completely covered him. A homeowner hired his employer to replace the 6-inch clay tile sewer pipe leading from his home to the alley behind the home and garage. The firm was "threading" a new 4-inch PVC pipe through the deteriorating existing clay 6-inch pipe, and leaving the existing 6-inch pipe in place. Prior to the victim's arrival, the employer excavated an approximately 8-foot-deep trench from the home's basement to the homeowner's garage. Once beyond the garage the employer dug another 8-foot excavation from the garage to the alley where the sewer connection was located. The soil conditions in the second excavation were sand/gravel and the angle of repose (maximum permissible slope) for the excavation sides varied from 60-80 degrees. To determine how far away the 4-inch PVC pipe was from the sewer line, the victim either kneeled or laid down at the bottom of the excavation. The victim was either still kneeling or lying on the ground when the south side of the excavation collapsed, completely burying him and burying his coworker up to his waist. 911 was called, and at the same time all employees jumped into the excavation to rescue the individuals in the trench. Emergency personnel arrived within minutes, removed the victim and transported him to a local hospital where he died the next day. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #04MI160.
Case 121	A 27-year-old male foreman was killed when a 13,000 pound steel plate he was staging came loose from the hoist slings and pinned him against another steel plate stack. The victim, working alone, was staging a 13,000 pound steel plate from the receiving bay in the steel storage warehouse using a 15-ton dual hoist crane. The crane was rated at a combined load of 30,000 pounds with each hoist bearing 7½ tons. The victim had positioned himself between two storage stacks. The stack to which he was staging was 63½ inches in height. The stack behind him was 43 inches in height. At some point during the staging activity, the slings on the hoist were either removed or came loose from the steel plate at all but three attachment points. The load shifted or slid toward the victim. The plate pinned him in a backward direction over the shorter stack. He was able to whisper for help but could not maintain control of the control pendant to remove the load himself. The driver of the semi-truck that delivered the steel noticed the victim's condition and called for help. Several other employees arrived a short time later, found the pendant under the plate, reattached the slings and lifted the plate from the victim. The victim slid to the floor. The employees stayed with the victim until emergency response arrived. He was pronounced dead

	at the hospital. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 70.
Case 122	A 34-year-old male temporary worker was killed when a 4000-pound coil of steel cable struck and crushed him while he was removing dunnage near a 3-row-high coil stack during longshoring activities aboard a vessel.
Suicide (4)	
Case 123	A 70-year-old male security officer died of a self-inflicted gunshot wound.
Case 124	A 72-year-old male farmer died of a self-inflicted gunshot wound to the head.
Case 125	A 66-year-old male died of a self-inflicted gunshot wound to the head.
Case 126	A 60-year-old male died of a self-inflicted gunshot wound.
Toxic Exposure (5)	
Case 127	A 45-year-old female caregiver at a group home died due to methadone intoxication.
Case 128	A 47-year-old female restaurant cook died from a drug overdose while at work.
Case 129	A 75-year-old female dairy farmer died from an acute bronchial asthma attack while cleaning out a bulk milk tank. Tank cleaning involves a rinse with a sodium hypochlorite/sodium hydroxide mix, followed by an acid rinse. The victim rinsed the tank with the sodium hypochlorite mixture. It appears that the sodium hypochlorite rinse was mixed with the acid rinse. A family member working in another area smelled the strong odor produced and went to see if the victim was okay. The family member saw the victim outside of the milking bulk tank room leaning against a fence, having difficulty breathing. Upon seeing her, the family member went to get a truck to transport her to the house. Upon returning, the victim was unconscious. Returning home, the family member called 911. A neighbor arrived and together they began CPR. The victim was transported to the hospital where she was pronounced dead. When the police investigated the incident, the family member stated that the victim used an inhaler regularly; one was found at the fence where she exited the milking bulk tank room. The victim died of an acute asthma attack.
Case 130	A 56-year-old male Hispanic handyman was working in a dwelling that was being heated by propane. Chemical analysis of his blood showed an elevated carbon monoxide level and toxicology results indicated that he had 0.03% blood alcohol level.
Case 131	A 19-year-old female waitress in a lounge/restaurant suffered a fatal asthma attack while at work. She did not have her inhaler with her. A customer lent her an inhaler, but the inhaler did not help relieve her symptoms. 911 was called. Fire personnel arrived first, and initiated CPR. EMS arrived and tried to bag her but could not get air into her

	lungs. The ventilating bag was very hard to squeeze. The victim was taken to a local hospital where she died.